MARCH 21, 1958

electronics

business edition

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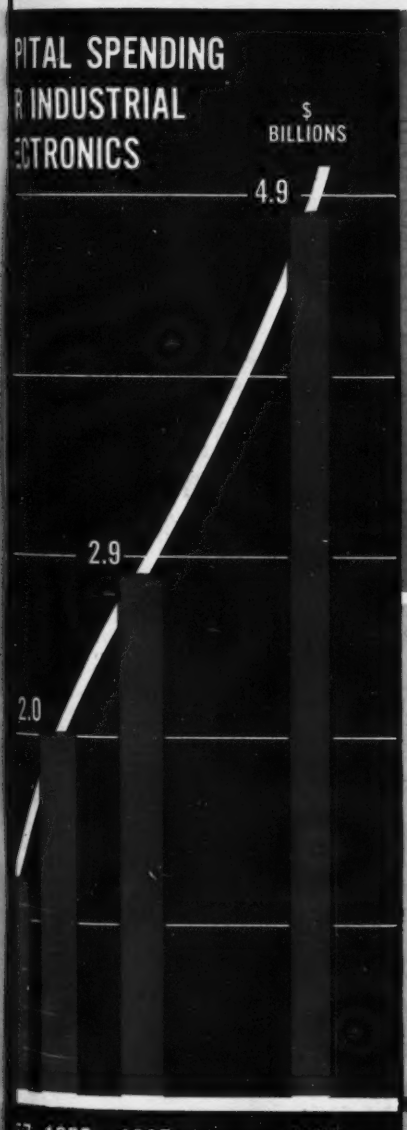

What's New at '58 IRE Show?

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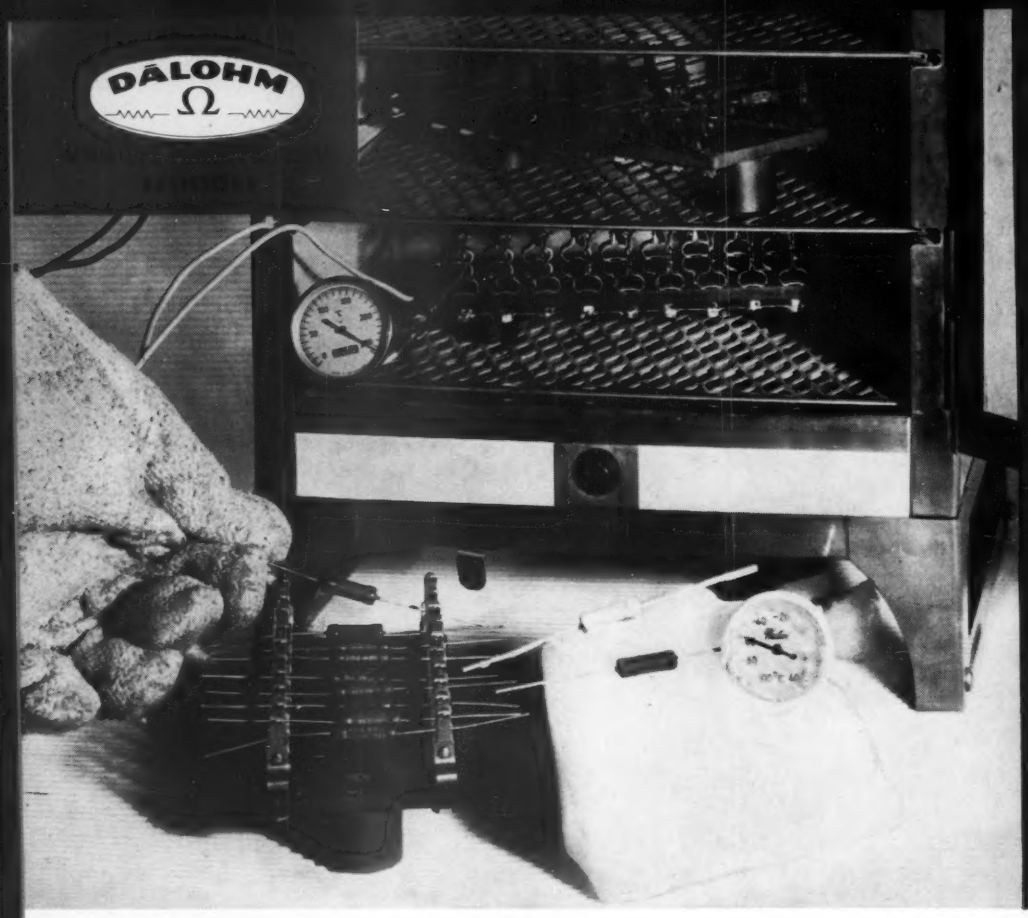

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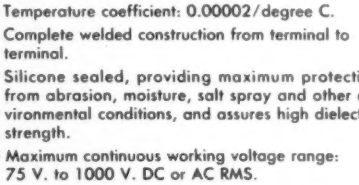

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electronics business edition

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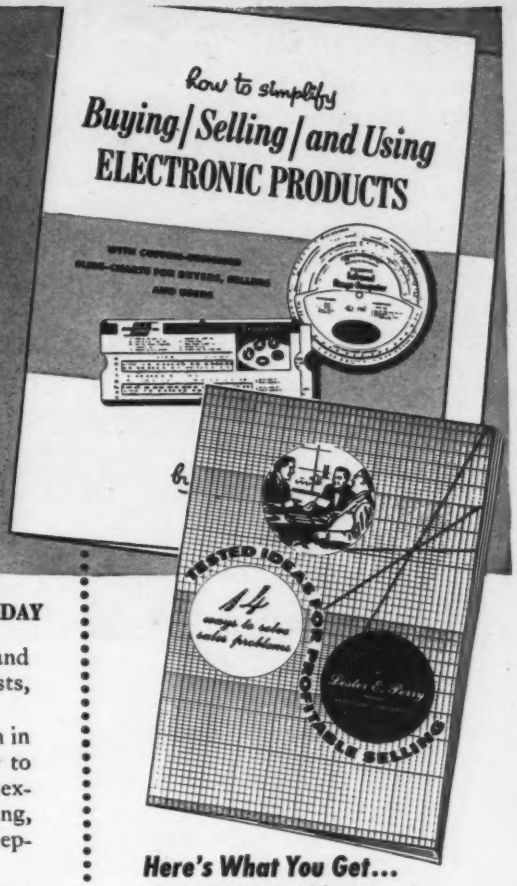

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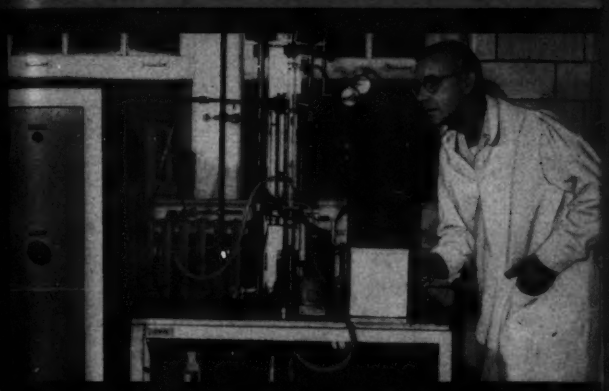

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Lifetime Min.	200 microseconds

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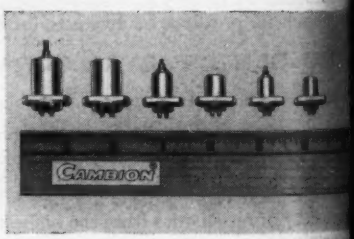

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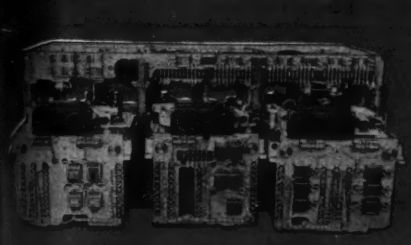

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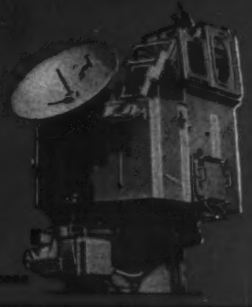

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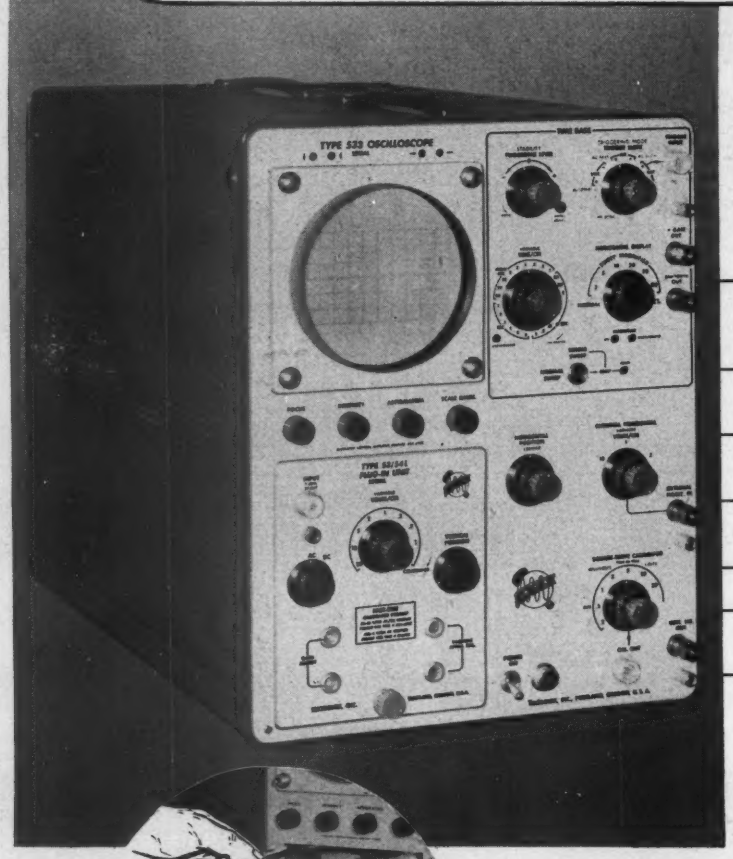

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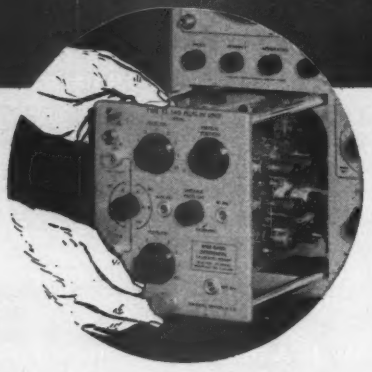

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Contracting Criticized

Fairness of military renegotiation, termination methods questioned by men dealing with government

ARE MILITARY CONTRACTORS getting a square deal under the present system of contract payment?

This question has recently been raised about both contract renegotiation and contract termination methods.

The Renegotiation Board was criticized by J. L. Atwood, president of North American Aviation, in a speech before a New York financial group.

On one hand, experienced procurement officials negotiate contracts with incentive provisions allowing about 20 cents additional profit for each dollar saved in production costs, Atwood said.

On the other hand, he said, the Renegotiation Board often steps in and claims amounts equal to or more than the incentive profits as excessive profits under the Renegotiation Act.

"It is not easy to understand what service the Board is performing when, for example, it deprives industry of $20 million that generated a net saving to the government of $80 million," he said.

Atwood expressed hope that the Renegotiation Act will be permitted to expire at the end of 1958. In addition, he said, Congress should convince the Board, which would still renegotiate prior year contracts, that it never intended to remove all profit incentives from defense contracting.

Contract termination regulations were attacked last week by William H. Bisnoff in an interview with ELECTRONICS. He is now a partner in the military contract consulting firm of Bisnoff-Armus Associates of New York City.

The Armed Services Procurement Regulations should be revised to allow for anticipated profits lost because of contract termination, he asserts.

When contracts are terminated, present regulations allow nothing on the uncompleted portion other than costs, some profit on work-in-process and cost of termination inventory, he said.

These regulations are unfair to the contractor because contract termination generates extra costs from unused facilities, he believes.

A firm which accepts a military contract must reserve facilities to handle the contract, often by turning down other business, he said. When contracts are terminated, facilities reserved for contract work are usually idled. The contractor is then faced with the cost of maintaining these idle facilities until replacement business is obtained.

Present day contract termination procedures came into use because of the unexpectedly sudden end of World War I. The government had no provision for mass termination and subjected itself to damage claims when it called a halt to war production.

To avoid a recurrence of this situation, the current contract clause providing for termination at government convenience was devised and first used in World War II.

No one can dispute the use of this contract provision in wartime, he admits. Sacrifice is expected from all. Further, everyone who enters into war contracts anticipates this work will halt at war's end.

However, continued use of the termination for convenience clause since hostilities ended in Korea is neither justified nor required, he claims. He believes corrective measures will be achieved only if contractors make the effort to bring them about. He suggests concerted effort by military contractors through trade organizations, by consultation with Armed Services contracting authorities, and through their congressional representatives.

SHARES and PRICES

THE RECENT successful completion of the first public issue of J-V-M Microwave during the currently depressed stock market focuses attention on the opportunities for microwave manufacturers at this time. Their products are used in a wide variety of advanced military equipment that is currently in heavy demand.

Typical Microwave Component Manufacturers	Recent Price	Dividend Rate	Percent Yield	Earned Per Common Share 1957	(Period)	1956	Traded	1957–1958 Price Range
J-V-M Microwave	3[1]	0.20	6.7	.09	(5 mos)[2]	N.A.	OTC	.....
Litton Industries	38	....	....	1.05	(6 mos)[3]	0.71	NYSE	29½–56⅝
Microwave Associates	10¾[1]	....	....	0.13	(year)[4]	0.47	OTC	.....
Raytheon	22¾	....	....	2.41[5]	(year)	N.A.	NYSE	16⅜–24⅝
Sylvania	35	2.00	5.7	3.48	(year)	4.03	NYSE	29¼–46¼
Varian Associates	15[1]	....	....	0.56	(year)[4]	0.42	OTC	.....

[1] bid [2] ended Nov. 30 [3] ended Jan. 31 following year [4] ended Sept. 30 [5] estimated

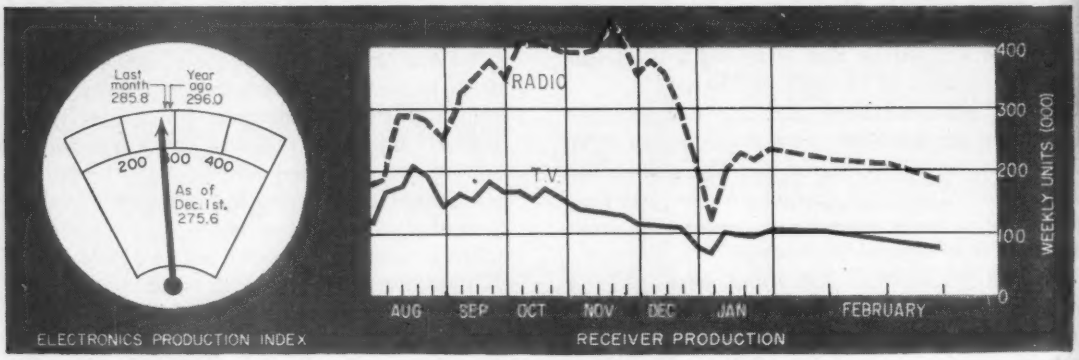
MERGERS, ACQUISITIONS and FINANCE

• **Litton Industries,** Beverly Hills, Calif., and **Aircraft Radio,** Boonton, N. J., have called off plans to merge through an exchange of stock. Total ARC shares deposited for exchange was less than the 80 percent required under terms of the proposed merger agreement. Litton had offered to exchange 7/10ths of a share of its common stock or 23/100ths of a share of its voting preferred stock for each share of Aircraft Radio stock. Group of ARC shareholders, who were unwilling to deposit their stock for exchange, claim exchange offer was not enough. Only about a year ago Aircraft Radio was discussing merger plans with **Airborne Instruments** of Mineola, Long Island, N. Y. Its reported that proposed merger was called off because of inability to agree on who would run the combined firm.

• **Hoffman Electronics,** of Los Angeles, files a registration statement with the SEC covering $375,000 of interests in its Employee Thrift Plan, together with 14,974 shares of Hoffman common stock which may be acquired as part of the plan.

• **El-Tronics,** Philadelphia, Pa., acquires the **Computer Division of Alwac Corp.** of New York and Los Angeles. El-Tronics will issue and exchange 300,000 shares of its common stock and $600,000 of 10 year debentures for the computer division's assets. E-T's common stock closed at $3 on the American Stock exchange on the day of the announcement. The Philadelphia firm makes both electronic and nucleonic devices. Alwac makes medium-size digital computers. World-wide interests of Alexander Wenner-Gren, which include Alwac, have become the largest shareholder in El-Tronics as a result of the merger. Working agreements have been worked out between El-Tronics and several European enterprises in which Wenner-Gren is interested. No important changes are contemplated either in executive personnel or present manufacturing facilities.

• **Midwestern Instruments,** Tulsa, Oklahoma, purchases the **Modern Art Metal Finishing Company** of Chicago for an undisclosed sum. It was the third company purchased by Midwestern as part of a plan for adding to its facilities essential elements over which it can exercise complete quality control. Modern Art's equipment is being moved to Tulsa where it will become part of a new Midwestern plant. M. E. Morrow, board chairman of the Tulsa firm, said further expansion was definitely indicated.



FIGURES OF THE WEEK

RECEIVER PRODUCTION

(Source: EIA)	Feb. 28, '58	Feb. 21, '58	Mar. 1, '57
Television sets, total	89,466	86,903	97,949
Radio sets, total	176,851	192,460	345,342
Auto sets	54,473	70,792	135,700

STOCK PRICE AVERAGES

(Source: Standard & Poor's)	Mar. 5, '58	Feb. 26, '58	Mar. 6, '57
Radio-tv & electronics	45.89	45.34	47.01
Radio broadcasters	55.04	55.37	63.85

FIGURES OF THE YEAR

	1957	1956	Totals for first 11 months Percent Change
Receiving tube sales	456,424,000	464,186,000	− 1.7
Transistor production	28,738,000	12,840,000	+123.8
Cathode-ray tube sales	9,721,008	10,987,021	− 11.5
Television set production	6,399,345	7,387,029	− 13.4
Radio set production	15,427,738	13,981,800	+ 10.3

LATEST MONTHLY FIGURES

EMPLOYMENT AND PAYROLLS

(Source: Bur. Labor Statistics)	Oct. '57	Sept. '57	Oct. '56
Prod. workers, comm. equip.	412,000-p	417,900-r	413,100
Av. wkly. earnings, comm.	$76.44 -p	$78.40 -r	$78.78
Av. wkly. earnings, radio	$74.40 -p	$76.02 -r	$75.70
Av. wkly. hours, comm.	39.0 -p	40.0 -r	40.9
Av. wkly. hours, radio	39.0 -p	39.8 -r	40.7

TRANSISTOR SALES

(Source: EIA)	Dec. '57	Nov. '57	Dec. '56
Unit sales	2,773,000	3,578,700	1,608,000
Value	$6,619,000	$6,989,000	$4,691,000

TUBE SALES

(Source: EIA)	Dec. '57	Nov. '57	Dec. '56
Receiving tubes, units	27,736,000	39,950,000	34,340,000
Receiving tubes, value	$24,881,000	$33,166,000	$29,111,000
Picture tubes, units	644,026	772,801	795,476
Picture tubes, value	$12,971,487	$15,138,438	$13,423,157

It's a tried and true axiom of American business that to be successful, you must "think big". We don't mean to rock the boat, but, when it comes to electrical connectors, we at Scintilla Division of Bendix Aviation Corporation have made a strict practice of thinking small. It's worked out pretty well.

When we first put our connectors on the market in 1946, we were delighted at the response of manufacturers throughout the electronics industry. To put it briefly, they bought all we could produce. We knew, however, that to keep the industry on our side, we would have to move faster and more efficiently with each passing year.

More than anything else, this meant achieving increased economy of size and weight. Along with improvements in quality and constantly expanded output, we have worked always to make smaller and ever smaller connectors without reducing performance standards in the slightest degree. As electronics became a full partner in the booming aviation and missile industries, the need for smaller electrical connectors continued to grow. We supplied them. The industry bought them.

Result: We are engaged in the greatest plant expansion in our history —it is to be devoted to vastly increased production of *better* electrical connectors. Only your confidence in the quality of the connectors made by Scintilla Division of Bendix Aviation Corporation—and in the integrity of the people who work here—has made this expansion possible. We shall endeavor to continue to merit that confidence. SCINTILLA DIVISION OF BENDIX AVIATION CORP., SIDNEY, N.Y.

Canadian Affiliate: Aviation Electric Ltd., 200 Laurentien Blvd., Montreal 9, Quebec

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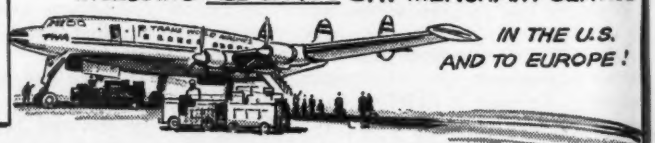

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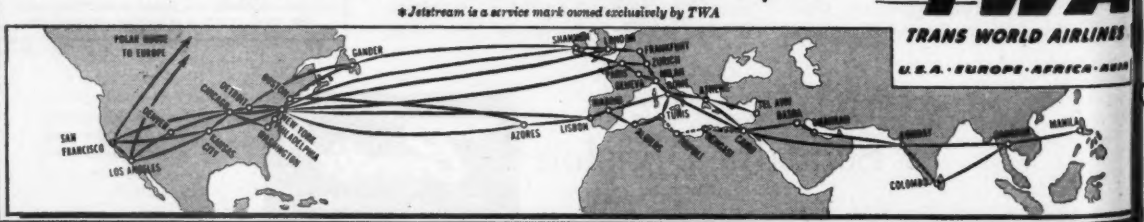

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STOCK SHEET

Each Monday our customers receive a stock sheet listing actual stock figures on more than 140 popular production-run HyperCores. If you, too, desire this service, write the Moloney factory.

2

MASTER HYPERCORE BOOK

1500 standard and special cores, with dimensions, prices, and quantity in stock kept current daily. For immediate, accurate answers concerning cores, contact your Moloney representative.

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SHIPPING NOTICE

The same day your HyperCore shipment is made, we air mail a card giving complete order and shipping information. This card helps you with production scheduling and saves on expediting costs. Avail yourself of this service —order Moloney HyperCores.

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CIRCLE 9 READERS SERVICE CARD

WASHINGTON OUTLOOK

THE EISENHOWER ADMINISTRATION is stressing the step-up in military procurement as a strong point in its antirecession program.

(1) There's now to be "greater emphasis on urging prime contractors to give preference to qualified (military) subcontractors in labor surplus areas to the full extent permissible under existing law."

(2) The services have been directed to "assure that the maximum number of contracts are available to small business generally as well as to labor surplus areas."

Pentagon observers, however, doubt that the new orders will have much of an impact on the pattern of procurement in military hard goods—and particularly electronics.

For years, there's been a standing policy to favor small companies and firms in labor surplus areas as much as possible in military procurement. The policy boils down to this: when a procurement program is set up, a specific dollar amount of the order is set aside for bids from small firms and from companies in labor surplus areas. The set-aside is established only if the nature of the production is general enough to provide for a broad selection of qualified contractors.

Reliability in performance is the keynote to procurement of military electronics and hard goods. Only when a small company or a firm in a labor surplus area is technically qualified to take on complex defense work can it figure in the set-asides.

The military services determine a "weighted average price" which is based on bids from all of the companies competing for a new contract. Then the smaller companies eligible for the set-asides are allowed to make comparable bids.

Privately, most Pentagon officials see little change in the pattern of contract-letting under the President's new orders.

- **The volume of new military contracts is rising sharply.** During January-March 1958, the total for major production comes to $4.9 billion, according to preliminary estimates. During April-June 1958, the total will rise to $5.1 billion. Roughly 28 percent of these amounts will go for electronics.

  These figures compare to $3.9 billion during October-December 1957 and only $2.2 billion in July-September 1957. As plans shape up now, average quarterly volume of new orders after June will come close to $5 billion for at least another year.

- **Office of Defense Mobilization has issued new rules for accelerated tax amortization of defense production facilities.** Briefly, five-year write-offs will be limited to plant and equipment for production of "new or specialized items, or research, development or experimental services" on direct contract for the Pentagon or the Atomic Energy Commission.

  "New" means any item not in production before January 1957. "Specialized" means an item with no civilian market.

  Six-month time extensions will be granted on facilities approved but not started before last August. In addition to this, an item may be classed as new for tax write-offs if existing facilities are ruled inadequate.

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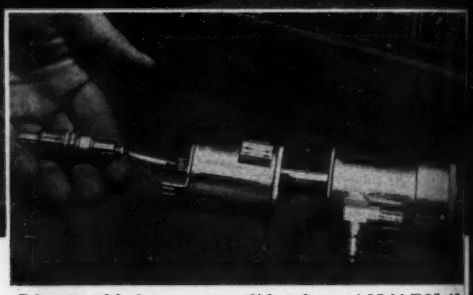
251-57

(Left to Right) Frank Marshall, Assistant Engineer, Arthur H. Wulfsberg, an Assistant Director of Research & Development, and John Sprengeler, Project Engineer, discuss the use of a General Electric GL-6442 in a power amplifier assembly which is part of the AN/ARN-46 receiver-transmitter unit shown in center foreground.



Disassembled power amplifier from AN/ARN-46. A G-E GL-6442 is used in each of 3 such amplifiers within the TACAN receiver-transmitter unit.

Collins Airborne TACAN Uses General Electric GL-6442 For Reliable Performance

EXCEPTIONAL performance characteristics of General Electric tube type GL-6442 are contributing significantly to the accurate and reliable performance of Collins TACAN equipment, which is capable of operation at altitudes over 70,000 feet.

TACAN provides the military or civil pilot with continuous, precise distance and bearing information for navigation at ranges up to about 200 miles.

The pressurized receiver-transmitter unit of the equipment employs five G-E GL-6442's—ceramic, disc-seal triodes of planar construction—in the frequency multiplier and power amplifier systems. Three of the tubes are used in the pulse-modulated final amplifier. These tubes are mounted in coaxial resonators, tunable over a 1025-1150 mc. range. More than 1 KW peak power output is obtained.

Designed primarily for use in grounded-grid cavity circuits as a plate pulsed oscillator or amplifier up to 4000 mcs., the tube is also useful as a continuous-wave RF power amplifier, oscillator, or frequency multiplier up to 2500 mcs. Typical operation in plate-pulsed oscillator service at 3500 mcs. produces 2 KW peak power output with an average power input of 7.5 watts and a duty cycle of 0.001.

Ratings for other classes of service available on request. For full information on Type GL-6442, call your regional G-E power tube representative. *Power Tube Dept., General Electric Co., Schenectady 5, N. Y.*

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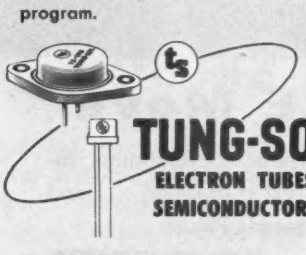

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CIRCLE 23 READERS SERVICE CARD

EXECUTIVES IN THE NEWS

Baker: elder statesman

THIS YEAR'S IRE Founders Award teaches an object lesson in willpower. The man receiving it next Wednesday night was almost incapacitated last June by a severe stroke. He has willed himself to recovery, now plans increasing his activity as research v-p of Syracuse University.

Walter R. G. Baker has currently set up his office in St. Joseph's Hospital in Syracuse, N. Y. Go to his office there and you'll find a man impatient with having to sit still even as little as he does, and full of plans for the future. He talks animatedly about today's research and tomorrow's engineers: "It's very exhilarating work," he says.

Baker, one of the country's radio pioneers, was born in Lockport, N. Y., in 1892 and graduated from Union College, Schenectady, in 1917. "Physics and math were my pet subjects," he'll tell you; "they still are." He worked for the telephone company while in college, joined General Electric's laboratory in Schenectady the year of his graduation.

He went with RCA Victor in 1929 to head its engineering activities, wound up his stint in 1936 as engineering and manufacturing v-p. Then he went back to GE to ride the crest of the mushrooming electronics industry: he became v-p for all GE electronics in 1941, stayed in the job as it grew under him until it was split into several parts in 1956. He retired on his 65th birthday last November 30.

From GE, that is. His dynamo is still running, now hitched up to Syracuse University. The school's Institute of Industrial Research and Research Corporation both report to him. He and his wife—they were married in 1921—are just moving into a new house in Syracuse. For electronics' elder statesman, life and work continue apace.

COMMENT

Intercontinental Missiles

Your various articles on the subject of defense against intercontinental missiles interested me very much. Unfortunately, the basis for your reports is the intercontinental rocket, which in wartime would fall far short of defense requirements.

I am of the opinion—and I c

substantiate it—that for modern intercontinental missiles there is no practical possibility of defense. There is not even a jam-proof locating system, which is an absolute necessity for a successful defense.

It is clear to me that one should be careful of publishing general statements about these matters. In scientific publications, which must handle these subjects, all the facts should be checked carefully.

A. Lennartz
Berlin-Steiglitz
Germany

The U. S. defense establishment does not share Reader Lennartz's pessimism, definitely feels that both locating and defense systems are possible and within the scope of present technology. So do we.

The Ways of Masers

In your recent computer article ("What's Ahead in Computers," Mar. 7, p 17) you state that a maser "needs a magnet and a cryostat to provide control field and liquid-helium bath." I was under the impression that there was a type of maser which operated at room temperature.

W. R. Miller
Cleveland, O.

Reader Miller refers to the Suhl ferromagnetic variable-parameter amplifier, which, our sources tell us "is not properly classified as a maser." This device operates through precessing magnetization in the garnet of which it is made, indeed does operate at room temperature. Engineers anticipate "broader bandpass, more noise" than in the supercooled ruby maser.

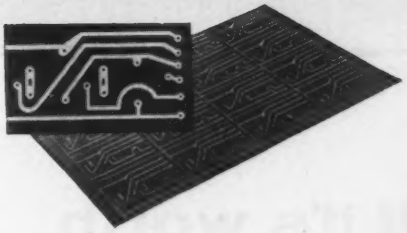
No Phototube

I should like to point out a mistake or misprint in one of your recent articles ("Japan Tries Infrared Tv," Dec. 20 '57, p 33).

You reported that the "output from the (infrared) converter feeds a photo-multiplier." But the fact is that no photo-multiplier is used in our nocto-television system; a conventional image-orthicon tv pickup tube is employed.

Tadakuni Fujii
Nippon Electric Co., Ltd.
Kawasaki City, Japan

cold-punch 'em fast without the cost of fixed dies!



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all recording and duplicating is on Audiotape and Audiodiscs

Pat Boone, Nat "King" Cole, Gale Storm, Patti Page, Burl Ives and many, many other stars have produced some of their top hit records in the ultra-modern studios of Universal Recording Corp. in Chicago. Eleven years ago Universal started with little more than an idea. Today, it has 900 active recording accounts for which it records and duplicates tapes, makes masterdiscs, produces commercials and sound tracks.

At Universal, Audiotape and Audiodiscs are used exclusively in all recording work! Why? In the first place, Universal has complete confidence in Audiotape's consistent standard of quality. As President Bill Putnam (left) puts it, "It's pretty disconcerting to run a whole recording or "take" and then find that the tape didn't do a quality job . . . that doesn't happen with Audiotape. Then, too, we're impressed with the original research Audio is responsible for in this field. We're particularly interested in the work on the reduction of print-through which resulted in the new Master Audiotape."

Universal is just one of the hundreds of professional recording studios which rely on Audiotape for the finest sound reproduction.

The complete line of professional quality Audiotape offers a base material and thickness to meet every recording need. And no matter which type you select, you can be sure you're getting the very finest tape that can be produced. There's a complete range of reel sizes and types, too, including the easy-threading C-Slot reel for all 5 and 7-inch Audiotapes. Why settle for less, when professional-quality Audiotape costs no more?

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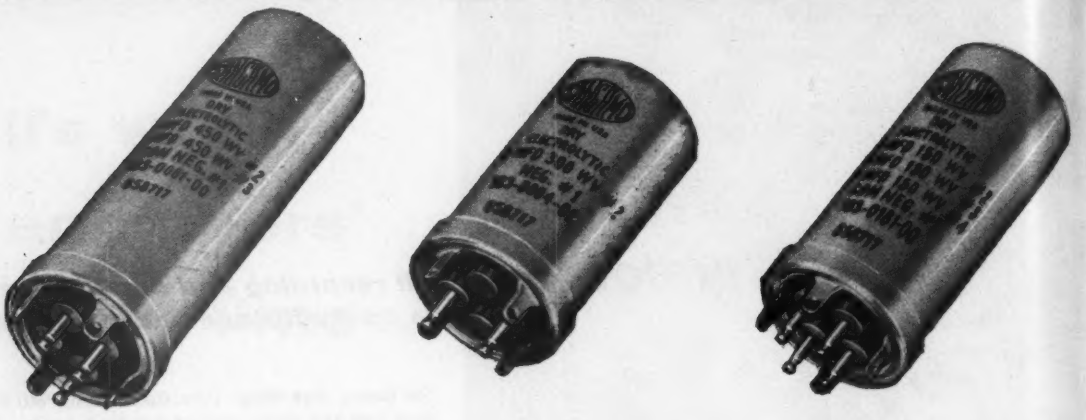


IN ELECTROLYTIC CAPACITORS

These new dry electrolytic capacitors are especially built for applications that require an extremely high level of reliability over long periods of time.

Sangamo Type TR capacitors are designed to operate in a temperature range from —20°C to +85°C.

The Type TR is well suited for use in communication systems; in all types of electronic industrial controls, laboratory test instruments, computer equipments, and in many other similar applications. Type TR capacitors are available in ratings from 3 to 450 volts D.C.

Sangamo Type TR

TWIST-TAB ELECTROLYTICS

have a life expectancy of at least 10 years when operated within their ratings These high reliability dry electrolytics are designed with safety factors to pass high ripple currents.

The use of high purity aluminum foil assures lower leakage current, and a highly effective end seal gives these capacitors unusually long operating life provided they are operated within their ratings.

Engineering Bulletin TSC 119 gives full information.

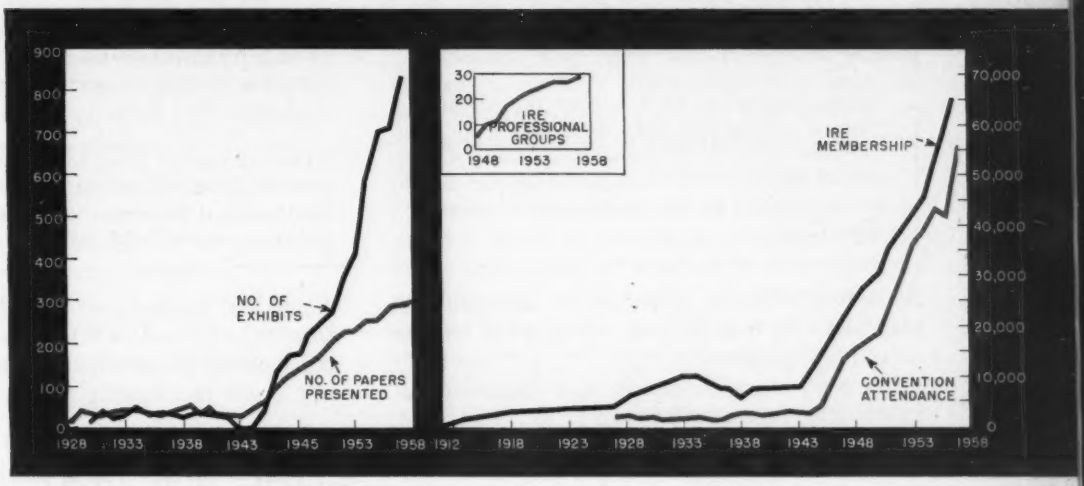
SANGAMO
Electric Company
SPRINGFIELD, ILLINOIS

SC58-1

electronics
business edition

MARCH 21, 1958

WHAT'S NEW AT '58 IRE SHOW—



Mirroring growth of the electronics industry, these charts indicate how next week's Radio Engineering exhibit has become a . . . .

Supermarket for Engineers

MORE EVOLUTIONARY than revolutionary. That, with few exceptions, is the impression products exhibited at the Radio Engineering Show next week in New York's Coliseum will give the visiting engineer.

Whatever the frontier was last year in product design—miniaturization, power, temperature-handling, frequency range, precision—some manufacturer has gone beyond it.

A preshow sampling of planned exhibits indicates more interest in basic things: components, materials, instruments, hardware and tools.

There will be less wooing of engineers by personnel men and a lot more by salesmen. Most booths will be staffed with men who speak technical language.

Some companies that lugged in whole systems in past years—partly for prestige, partly as engineer bait—this year will stress the bits and pieces they really wish to sell within the trade.

By and large, exhibitors are confident that volume will pick up around mid-year. Expectations run from the "ray of hope" variety to "definitely has to." The show will help firm up buyers' decisions.

"We've noticed in past years," says a young microwave firm, "that March is one of our slowest months and April one of our busiest. A lot of people get their budgets in January but don't buy until after the show."

Executives with some older companies see no such universal pattern, but agree that the show is an important part of their year-long sales effort. At one extreme the show is "necessary because our competition is there"; at the other it is "technical relations at its best."

The theme of the show is again "That New Idea". There will be considerable relevance between what is said in technical sessions and what is shown on the exhibit floor.

Microwave: Higher Power, Higher Frequency

Microwave is especially fruitful of advanced products. Frequencies are stretching up to 100 kmc. Meanwhile, high-power operation in the bands between 1,000-2,500 mc and below is creating new families of parts.

One reason for the extremely high frequencies is the fantastic miniaturization possible. Wave-guide

Quotes From Men In The Booths

"ALL OUR BOYS have instructions to get in there and pitch. No blondes or electric trains at our exhibit. We've gone through all that. Now we concentrate on a simple, attractive display of our product line and take each visitor on a discussion tour. We're doing our level best to sell at this show."–**New England**

"What we want to know is what the design engineers are looking for. Then we'll make it for them. Too many devices are being built, then in effect rammed down the engineer's throat because they are the nearest thing to what he needs at the moment." –**East Coast**

"We will be extremely interested in new components which would enable us to construct new or better products and, of course, any ideas or techniques that would reduce assembly costs."–**West Coast**

"We don't expect to sell merchandise. We want them to remember our line when they get back home. I'm going to scout the competition and line up some sales rep."–**New York**

"This year we are going to stress quality more than ever. You can't get ahead on price alone. The best way to sell at the show is go hunting for places to put your product."–**Midwest**

assemblies reduce to a few inches, so small that plumbing may have to give way to some form of dielectric propagation.

Electronic countermeasures and thermonuclear experimentation are contributing to the trend. Also, raising the frequency can give Doppler navigation a new order of accuracy.

One firm is introducing a 70-kmc silicon diode sensitive enough, it says, to make this frequency usable in high resolution systems. Another diode enables direct power reading at very low cost.

Universal power supplies for microwave systems avoid some rebuilding when frequency modifications are dictated. Power supplies are now made which can handle just about any tube at any frequency.

Microwave tubes still show the result of constant pressure for smaller size, greater versatility.

A new metal-ceramic traveling-wave tube includes as part of the tube the microwave matching structure. Used as a driver for high-power twt's, it is broadband and high gain, but little bigger than a pencil.

Another of the new twt's is a backward-wave oscillator only eight inches long, weighing five ounces without its magnet. Expected uses include multichannel circular waveguide communications systems.

An ammonia-type maser oscillator is offered in one-quarter cubic foot, weighs 20 pounds. Quite stable, it is suited to space guidance as well as communications.

Missile Guidance: New Gyros

Missile makers are not showing much hardware this year. Scuttlebutt blames security problems last year. On-the-record, many companies feel they can show more with pictures and animated displays.

Spectators will be able to make believe they are tracking a missile at one booth. The principle of the Jupiter's air-bearing gyro–literally floated on air instead of in a liquid–will be demonstrated. This is a development ex-Germans now at Redstone Arsenal first began investigating in the 1930's, Army says.

Communications: More Sideband

Manufacturers will have lots of the latest single-sideband equipment for amateurs and commercial communications.

A complete ssb station, combining receiver and transmitter as a transceiver, is to be shown. It won't be in the stores until September. Another company offers a linear amplifier transmitter.

Tv station engineers will look over test equipment that works while programs are on the air. Test signals are inserted between picture frames with no noticeable effect on viewing quality.

Advances in components, with several notable exceptions, seem to revolve this year largely around ingenuity, greater familiarity with new materials, size, and product line filling-in.

Some fields which have heretofore been virtually barred to transistor circuits are being assaulted. For example, hi-fi designers will find transistors available in the full range of audio frequencies and in precisely matched pairs for push-pull circuits.

Components: Packaging Progress

Varieties of components such as tubes, transistors, capacitors and resistors are so great that exhibitors will use many innovations in booths to attract attention. Some are set up for on-the-spot performance and environmental testing.

I-f transformers and sealed relays are down to sugar-cube size. Some crystal ovens are transistorized. Shields hug components to squeeze out waste space.

Power converters look like cigarette packs, some miniaturized power packs can be completely short-circuited without damage to components. Choppers

will take higher surges.

Radar pulse-forming components, potentiometer servos and many other specialized combinations are being offered in easy-to-design-with packages. Several of the circuit modules offered can be taken apart and rearranged.

Instruments: Precision, Portability

Scores of instruments at the show will qualify as something new. The name's the same, but precision, portability or the number of values one instrument can measure or produce is greater.

There will be more of the transistorized, battery-operated kind. Some new instruments aren't built just for mobility. They also avoid lab problems caused by fluctuations in line voltage.

Computers can be quickly programmed through patch boards with plug-in circuits. These often use modules with a male plug at one end and several types of interchangeable connections at the other.

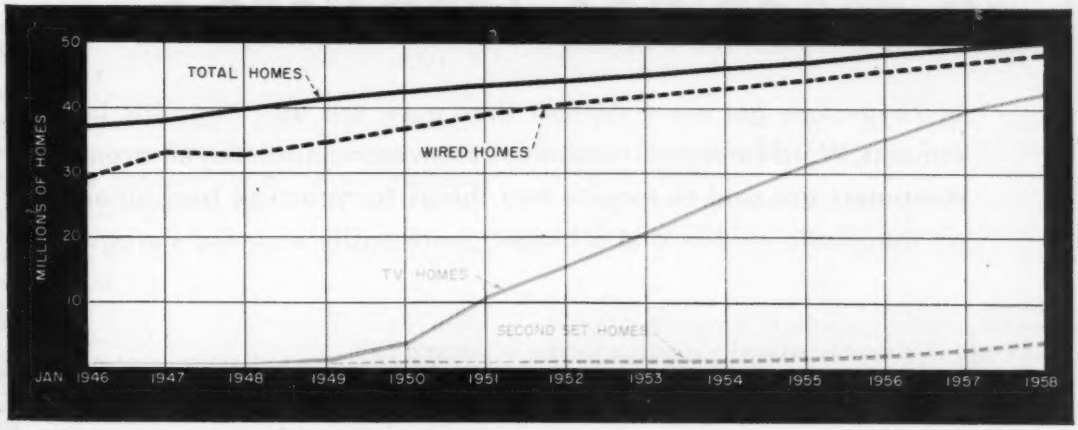
Some test equipment gaps have been filled. A new vtvm is specifically designed for measuring the complex waves peculiar to missile equipment. A noise-figure meter enables semiskilled personnel to handle in a jiffy checks that formerly required an engineer.

Production: Short-Run Mechanization

Production men whose chief problem is running off limited quantities of assemblies get a break this year. Component and machinery manufacturers are giving more thought to short-run automation problems.

Standardization of component packages is progressing nicely. Connector and fastener manufacturers are developing lines of tools to speed up assembly routine. Pneumatic and other hand tools quickly fasten wires in solderless connections or place and drive screws in rapid succession.

PRODUCTION and SALES



Tv First-Set Market Nears Saturation

Television's market for first black and white sets rapidly approaches 100 percent saturation.

At the beginning of 1958 there were 41.8 million television homes out of a total of 48.6 million wired homes in the United States or 86.0 percent of the total. Only 6.8 million homes or 14.0 percent of the total wired homes were without television.

Big increase in number of wired homes in this country since 1946 presages a time in the near future when wired homes and total homes will be practically synonomous.

The 8.4 million homes without electricity in 1946, some 22.2 percent of total homes, were narrowed to 1.5 million homes by 1958 or 3.0 percent of total homes.

Include non-wired homes in the total market and the degree of saturation drops slightly. There were 50.1 million homes in the nation in January and 82.0 percent had at least one tv set. Only 8.3 million homes or 16.3 percent of total homes had no tv.

With the rapid increase in saturation replacement business has become of increasing importance. Between 1952 and 1957 replacement sales increased from 35.5 percent to 59.4 percent of total television sales, according to ELECTRICAL MERCHANDISING's 1957 survey of electrical appliance sales.

The widely heralded second set market, counted on by many to take up the slack in sales due to greater first set market saturation, has not yet shown much oomph. At beginning of this year number of second set homes amounted to no more than 8-9 percent of total tv homes.

High-speed Strela computer used by the Russians for English-Russian translation studies. Scientists, engineers and linguists the world over are now anxiously inquiring . . .

Can Machines Translate?

Investigations get more support than ever, but vast linguistic job remains. Word-for-word translations seem economical. But electronic computers are said to require two things for practical translation: an automatic read-in and a bigger, more easily accessed storage

RESEARCH into the problems of translating scientific articles with an electronic computer is getting more support than ever this year. But the question is still asked: "Is machine translation practical?"

Answer right now depends on how good a translation is desired. There is some feeling among computer experts that fluent idiomatic translation of complete scientific texts will not be practical in 20 years, and may never be practical.

Word-for-word translations, however, will be possible before that question need be resolved. And these may be useful when more accurate translations are not worth the additional cost. Here are two projects in this area:

At the Harvard Computation Laboratory, after 10 years of linguistic and mathematical studies, a team expects to complete compilation soon of a 10,000-word automatic Russian-English electronics dictionary on magnetic tape. This experimental dictionary will produce a literal translation, one English word for each word in the Russian text. Russian words not in the dictionary will come out in transliterated form.

A group at the Massachusetts Institute of Technology, supported by National Science Foundation, is tackling German-English translation in the communications field. This team feels word-for-word translation is now possible with high-speed general-purpose computers, that it could be more economical with special-purpose machines and that it promises to be "considerably cheaper than man-made translations." The MIT group agrees that if a better translation is desired, much more detailed linguistic work will be required.

This year the National Science Foundation brought together representatives of government agencies interested in machine translation and a number of researchers. This, NSF believes, was a step towards better exchanges of information between different groups.

Until the nation's post-sputnik mood, linguists who had long been studying the problems of machine

translation, had been regarded as "ivory tower" researchers. Here's some idea of the magnitude of their task:

In linguistics there are a few rules and many exceptions to each rule. Each rule and each exception must be formulated as a computer rule. Idiomatic structures complicate the problem. While it is assumed by commercial computer people that general-purpose computers could do anything the linguists wanted, the problem is that the linguists are not yet sure what they want.

Now, with the great interest in scientific translations, some linguists think that the painstaking process of finding an optimum technique of adapting language to an electronic computer can be accelerated by the participation of more programmers.

Of particular interest to electronics people are what the Rand Corp., of Santa Monica, Calif., describes as "machine shortcomings":

Cost of converting words and sentence arrangements to machine-readable language is high. Right now, key-punch operators are used for this phase of the work, and this is satisfactory for research efforts. Practical translation of technical articles in Russian or other languages requires an automatic read-in device.

Dictionaries would be so large that present storage systems are inadequate, says Rand. Translation machines, to be economical, need bigger and more easily accessed high-speed storage, to store thousands of words and multiple meanings.

Researchers at the University of Washington's Department of Far Eastern and Slavic Languages have concluded part of their linguistics investigation and analysis of 111 Russian texts from 31 fields of science. This produced 14,000 Russian-English operational entries, now being supplemented by other forms of these entries that were not in the selected texts. Close to 200,000 entries are expected in the end. These are destined for the photoscopic memory developed by the International Telemeter Corp. of Los Angeles.

Studies of linguistic and mechanization problems of Russian-English translation have been made by Ramo-Wooldridge Corp. under USAF contract; by the University of Michigan's Engineering Research Institute which has worked partly in conjunction with the Rand Corp.; Georgetown University's Institute of Languages and Linguistics with NSF support; and the University of Washington under USAF contract.

Other work has been done at California Institute of Technology and International Business Machines Corp. In Cambridge, England, the Cambridge Language Research Unit is working under a grant from NSF. Another British team at Birkbeck College is working with French and German.

And how are the Russians doing in machine translation? Best information here is that they are doing "first rate work" in translating from English into Russian, a tougher job than translating from Russian into English in the opinion of both American and Russian experts.

There is some belief that Russian researchers are farther along than ours because of earlier support. However, a Soviet scientist commented in a recent technical article that formal analysis of English phraseology and syntax was proving extremely difficult.

Cities Buy, Plan

Two CITIES—Philadelphia and Detroit—are making news these days.

Philadelphia recently invested $600,000 for what police officials call "the most extensive system of microwave communication in municipal use." Project will be done by RCA.

The system will include four primary and 12 secondary base stations, all attended. They are designed to be multiplexed in varying combinations to blanket the city. Special alarm systems for failure detection will be provided.

Mobile units will include 570 two-way radios and 250 public address amplifiers in patrol cars and other vehicles.

Unique features of the system will be a punch-card center for recording and routing incoming calls, and a display board indicating location and availability of police vehicles.

This combination will allow central control dispatchers at city hall to send a patrol car to any location within seconds of receiving calls.

Installation of the system was begun this month. It is expected to be in full operation by mid-June.

In Detroit, a new system for warning expressway drivers of impending danger through a series of electronically-operated signs that flash traffic messages is now being drafted by the city's department of streets and traffic. The proposed experiment would cost more than $100,000.

The system would call for the signs to be built on the faces of expressway bridges where they would be used to warn drivers to slow down or leave the expressways.

The signs would be operated electronically from a central control room, which probably would be located in police headquarters. Blacked out when not in use, the illuminated signs would flash such messages as "Trouble Ahead," "Speed Limit 30" or "Use Next Exit." All three or any combination of the messages could be flashed simultaneously.

Does Radio Control Red ICBM?

Russian magazine says targeting 'precision' is achieved in same way that earth satellite is put in desired orbit by ground stations. Also reported: intercity tv via aircraft and ground relay . . old hypothesis proved by physicists . . trend to quantum technology

Soviet ICBM's can hit within six miles of a designated point in a target area through the use of ground-controlled beam-riding, a Soviet magazine says. The statement apparently refers to last summer's claim by the Russians that they had successfully fired an intercontinental missile.

The publication, *Technika Molodezhy* (Technology For Youth), gives an explanation of the way "precision" is achieved. It says the same radio control applies to both the targeting of the final stage of an ICBM and the orbiting of a sputnik.

When an ICBM final stage rocket reaches a height of more than 1,000 kilometers (620 mi), says the article by Prof. Georgi Pokrovsky, ground radio stations take over. Three or four radio stations create a "shaft" hundreds of kilometers long by which the rocket is steered. If the rocket veers from the center of the path, it encounters signals strong enough to return it to the beam's "eye."

Similarly, says the article, the rocket vehicle for an earth satellite is fired in a more horizontal position and then controlled by signals from a radio network. The article suggests that a satellite may be put into one of a number of possible orbits by horizontal manipulation of the final stage rocket that carries it.

Within this century, writes Pokrovsky, radio stations on earth may make possible outer space highways and bridges consisting of radio waves and electromagnetic fields.

Intercity Tv Via Aircraft

Another kind of radio bridge is reported by Russian television researchers. This involves the use of aircraft to relay tv from city to city, an idea tried by American engineers after World War II but generally considered to be not economically feasible.

A new system of long distance tv transmission using both airplanes and intermediate ground stations has reportedly been devised by Prof. Pavel Shmakov in Leningrad's Electrotechnical Institute of Communications.

Aircraft relays from Leningrad to Tallinn, Estonia, have been called successful. A Moscow-Leningrad link is being readied. This will involve a ground station at Valdai, midway between the two cities, and two planes. Conceivably, this could be a forerunner of a tv satellite already predicted by the Russians to be close at hand.

Progress is also reported in intercity transmission of color movies and color negatives. Shmakov's group is using an experimental color tv camera based on the "traveling light beam" principle. It can also take black-and-white pictures. The camera is said to be simpler in design, easier to operate and better in terms of picture quality than Russian tv cameras now in use.

Quantum Radio Technology

Looking at the future of radio engineering, Moscow Professor M. Zhabotinsky sees a trend towards quantum radio technology. He predicts that radio-spectroscopes operating on a few hundredths of a millimeter will make it possible to locate substances only a billionth of a gram in weight.

"With the help of molecular generators and amplifiers," he writes in a Soviet publication, "it will be possible to carry out on artificial earth satellites moving in different orbits complex observations of the universe and to transmit their results to earth.

"Molecular generators will help in the solution of such problems as the verification of the general theory of relativity, study of the irregularities in the rotation of the earth, and the creation of infinitely exact atomic standards."

Zhabotinsky believes quantum radio technology will help unravel many mysteries of intramolecular, atomic and nuclear forces. This, in turn, he adds, will make possible more effective chemical process control and creation of materials with new qualities.

Molecular Forces Calculated

In another Soviet publication it was reported last month that Russian scientists have proved theoretically and experimentally the old hypothesis that the source of molecular force is the reciprocal emission and absorption of electromagnetic waves by the molecules.

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Resistance Range — Low	25	40	25	Ohm
High	1	1	2	Megohm
Resistance Tolerances (to order)	½, 1, 2, 5	½, 1, 2, 5	½, 1, 2, 5	%
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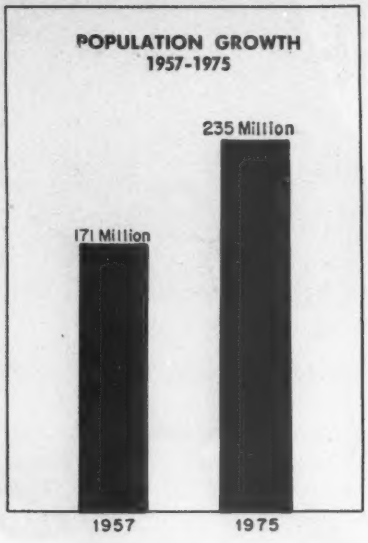
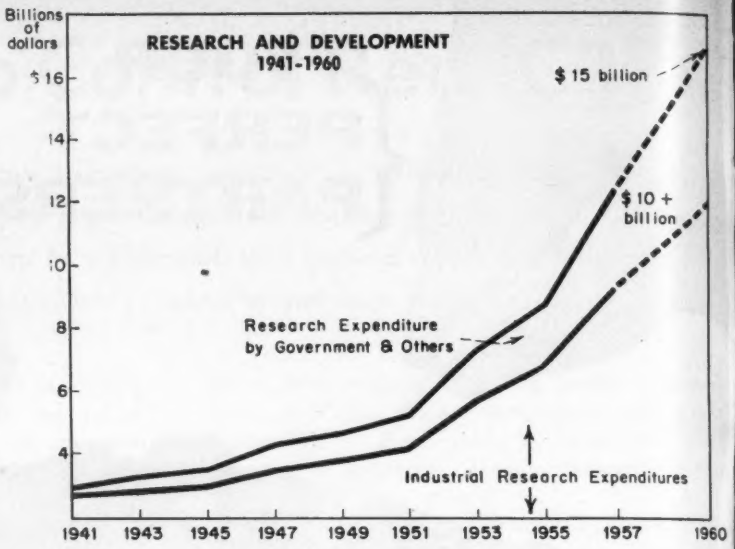




Population Expansion + Stepped Up R&D Expenditures = New Products,

Long-Term Sales Outlook Good

Electronics to get huge bite of big hike due in plant and consumer spending. Four-fold rise in industrial sales expected by 1975; consumer sales will more than double. Population growth, new product research will spark general business boom due to start in sixties

BECAUSE OF ATTENTION given the current economic pause, don't lose sight of the big boom in general business that will start in the sixties and result in a huge hike in spending for industrial and consumer electronics.

The American economy's prospects for growth between 1957 and 1975 are stupendous, reports McGraw-Hill's Department of Economics in a special study of the nation's growth prospects. Moreover, the report indicates the electronics industry will get a heaping helping of the sensational rise in both capital investment and consumer spending that will occur in this period.

By 1965 gross national product is expected to rise 35 percent above the 1957 level, climbing from $434 billion to $581 billion. It is expected to almost double by 1975, when it should amount to a whopping $835 billion.

Two largest items in the gross national product pie are business capital expenditures and consumer expenditures; other main item is government expenditures. Capital expenditure total, which was $37 billion in 1957, will climb slowly at first—to $39 billion by 1960—but will jump to $49 billion in 1965 and $70 billion in 1975.

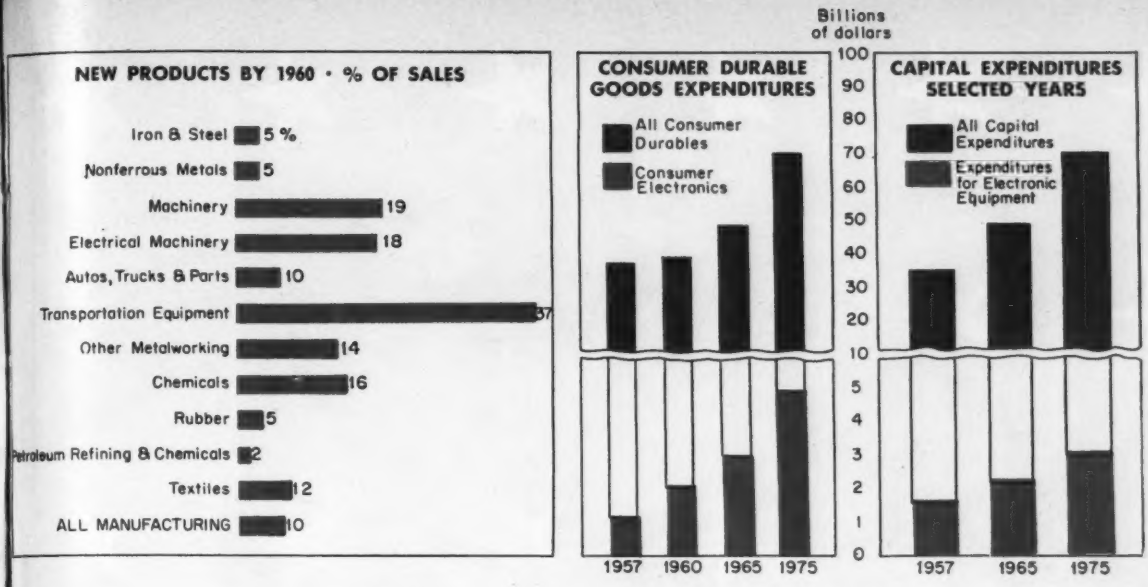
Commercial and industrial spending for electronics, about $1.2 billion in 1957, should increase by almost two-thirds by 1960, one and a half times by 1965 and four times by 1975. ELECTRONICS **predicts industrial and commercial sales of $2.0 billion in 1960—$2.9 billion in 1965—$4.9 billion in 1975.**

Last fall American industry told ELECTRONICS that 3.2 percent of planned capital expenditures in 1957 would go for electronic equipment. They also said that electronics' percentage of the total would rise to 5.2 percent by 1960.

McGraw-Hill economists predict total consumer spending will increase from $295 billion in 1957 to $401 billion in 1965 and $585 billion in 1975. Important to our industry is the part that will be spent by consumers on durable goods—due to double between 1957 and 1975, going from $35 billion in 1957 to $49 billion in 1965 and $70 billion in 1975.

Consumer electronics' share in consumer durable goods spending, now $1.4-$1.5 billion, should enjoy a minimum increase of 50 percent by 1965 with sales of $2.1 billion. By 1975 sales should top $3.0 billion, more than double 1957.

Not included above are allowances for jumps in


NEW PRODUCTS BY 1960 · % OF SALES
Iron & Steel 5 %
Nonferrous Metals 5
Machinery 19
Electrical Machinery 18
Autos, Trucks & Parts 10
Transportation Equipment 37
Other Metalworking 14
Chemicals 16
Rubber 5
Petroleum Refining & Chemicals 2
Textiles 12
ALL MANUFACTURING 10
CONSUMER DURABLE GOODS EXPENDITURES
All Consumer Durables
Consumer Electronics
1957 1960 1965 1975
Billions of dollars
100 90 80 70 60 50 40 30 20 10 5 4 3 2 1 0
CAPITAL EXPENDITURES SELECTED YEARS
All Capital Expenditures
Expenditures for Electronic Equipment
1957 1965 1975

Processes and a Rise in Factory and Consumer Spending

housing expenditures. Prediction is housing expenditures will rise from $15 billion in 1957 to $21 billion in 1965 and $30 billion by 1975. Electronics' share of housing money will come from items like built-in electronic ranges, television sets, electronic vision sets, electronic garage door openers.

Here's the background behind the predictions in a nutshell:

Population expansion plus stepped up research spending by industry and government will create a host of new consumer products, new industrial products and manufacturing processes. Result will be a tremendous rise in both capital and consumer spending.

Population expansion sets the stage for the new boom. Nation's population is expected to surge from 171 million to 235 million. It will provide both the market and the labor force required for the predicted high levels of business activity.

More people and more income per person spell out the market. Average income per person, after taxes, is expected to increase about 40 percent between 1957 and 1975, from $1,760 to $2,497.

The work force, which numbered 65 million and comprised 41 percent of total population, will increase to 88 million by 1975, only 38 percent of total population. Moreover, average work week is expected to drop from 37.5 to 35.5 hours.

To produce the greater amount of goods and services that will be required, worker output per man-hour will increase at rate of 2½ percent per year. Output increased at better than this rate in the 10 years following World War II, but rate has been less in the last two years.

To achieve the increased output goal means substantial improvements in production techniques. More automation and faster communications, both requiring more electronic gear, will be needed. Electronics' share of capital equipment spending should hit six percent by 1965, seven percent by 1975.

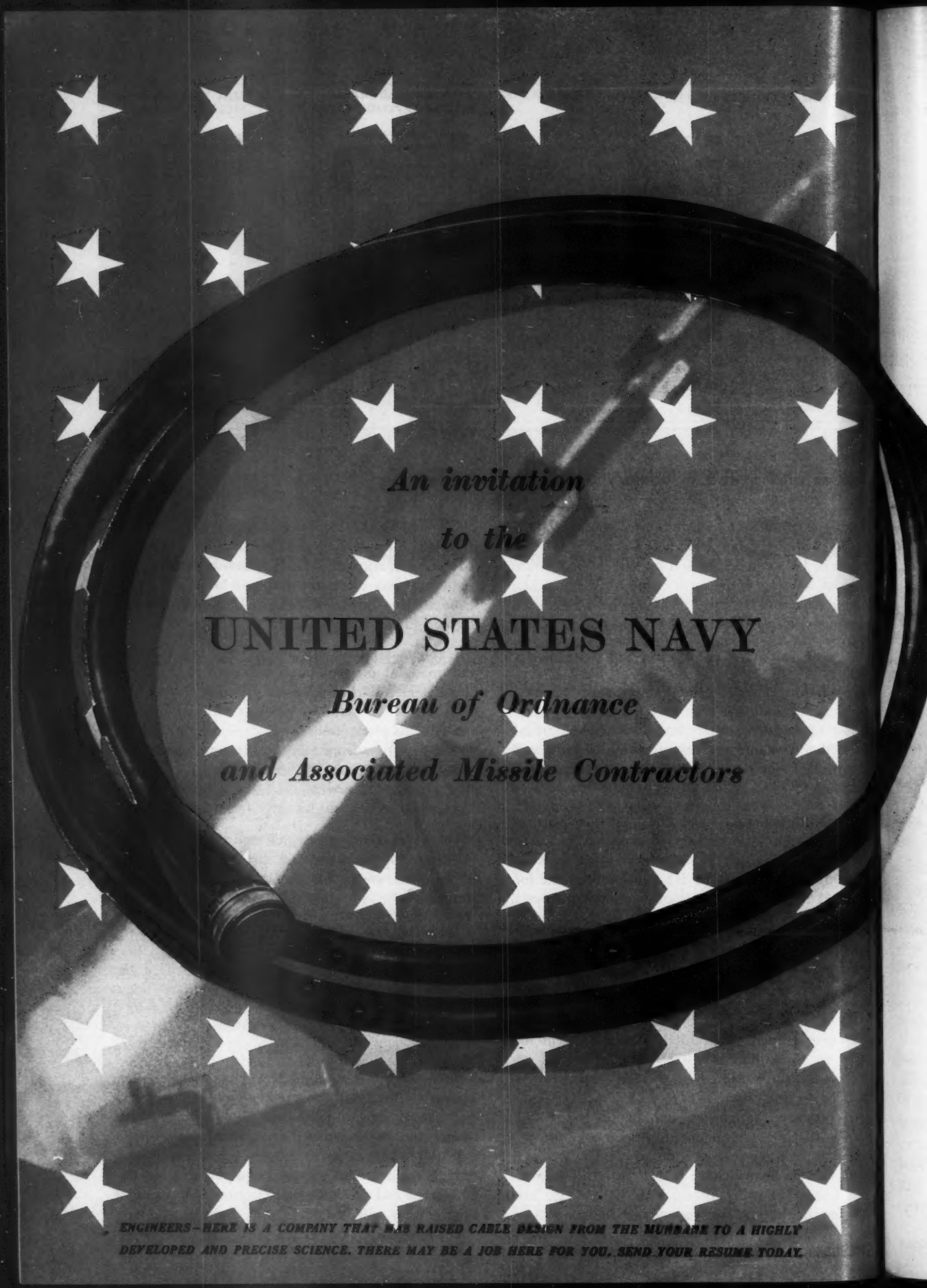
But larger population and larger work force are not enough. New products will have to be created to meet increased competitive pressures. New tools will have to be made for workers to meet expected increases in production.

Moreover, way must be prepared in advance because there is at least a seven-year lag between commencement of a new product development and the time when it is ready for large-scale production.

However, zooming research and development expenditure by industry, and to a lesser extent by government, are paving the way for a host of new products.

Industrial research and development expenditures, largely confined to new product development, have been rapidly increasing ever since the end of the Korean War. In 1957 American industry spent $7.3 billion on research, nearly twice the $3.7 billion spent in 1953. Prediction is industry research expenditures will total more than $10 billion by 1960.

Many of the new products will be new electronic items or substantial improvements on old ones: like wall-size tv screens, electronic cooking ranges and ovens, color television and electroluminescent lighting. However, as new products achieve large-scale production, new factories and equipment must also be created and the industrial electronics segment of this industry will benefit.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- Costs have been far less than predicted.
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Of special interest will be PAPI's Water Tight cable, which salt water cannot penetrate at 500 fathoms. It is ideal for underwater umbilicals.

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CIRCLE 29 READERS SERVICE CARD

IRE Show: Broader Horizons

At a time when specialization is building higher fences around electronics engineers, next week's IRE National Convention gives more attention to the broader questions of where electronics is going in education, in industry and in the solar system

TRENDS to suit every engineering taste are to be reported at the IRE National Convention in New York next week. What hits you right between the eyes is the impossibility of catching up with everything new in the electronic art.

While arranging the program to satisfy specialized needs, the committees made a conscious effort to take off the blinders required by the sheer weight of information available.

Each conventioneer at most has time to listen and discuss 40 or 45 of the 288 scheduled talks. Even before he opens his program, he has missed perhaps 500 papers rejected for lack of time, not merit.

Most sessions revolve around specific interests. Some, however, straddle the fences. Five panel discussions will give listeners a broadband view of the future of engineering education, electronics in space and industry and how nature designs her systems.

• "It may seem like looking pretty far ahead," George Haller, program chairman, comments on the space panel, "but the electronics industry today is like Alice in Wonderland. It has to keep running just to stand still, just to keep pace with some other fields."

Panel members, he points out, are not all electronics engineers. Some are "experts who are coming down the home stretch with electronics. All fields are beginning to merge."

The panels on education will speak of the need for greater versatility in engineering. They'll urge a wider background in fundamental knowledge.

"We should teach the basic scientific courses," says J. D. Ryder, dean of engineering at Michigan State, an electronics man himself. "Hardware courses, the ones that put labels on engineers, should be stripped from the curriculum."

The panel on biological transducers will discuss nature's ways of handling control information, interpreting them in an engineering context.

Nature–human nature–is also related to communications in a few other sessions. Psychological inferences in communications imply consideration of the design of the human receiver.

Biology-electronics works two ways. One medical electronics report deals with a possible method of understanding the fetal problems which cause stillbirths and retarded children.

The panel on electronics in industry is expected to indicate that process control systems are over the hump. Progress in reliability and industry's economic needs are both giving this field a lift.

The Canadian Post Office's automated mail-handling system, discussed in a preliminary fashion last year, rates an entire session this year. New features will be shown in detail.

Stereo, a subject that is financially fascinating to phonograph makers, also rates its own session this year. It has been the driving force behind tape recordings and is now being translated into disk recording systems.

Tv drops back to the last session in the conference, five papers on receiver design. But papers on broadcast and military considerations raise the total to a fat 15.

Broadcast, including tv, dominates six sessions. Predictions of things to come: regional sharing of commercial frequency, transistorized mobiles, digital coding which will handle voice and printing, communicating with sound, light and gamma rays, compatible single-sideband as a solution to tv interference with a-m broadcasting.

Microwave, radar and their components get four dozen papers, including several on microwave applications in instruments and data storage.

Microwave instrumentation will also be discussed as a method of measuring thermonuclear reactions. The AEC is reportedly using frequencies up to 90 kmc to measure plasma and may eventually require systems operating as high as 300 kmc.

While transistors and semiconductors have only one session all to themselves this year, they still permeate the atmosphere. More emphasis is given

this year to their applications in specific equipments.

For example, a tube maker describes a new high transconductance electron cathode ray tube gun. Its drive requirement is only 2-6 v instead of the usual 50-70 volts, yet it gives high-quality images.

Picture and radar tubes having new gun can be directly driven by transistors, enabling transistorization of home, industrial, military tv receivers.

Ultrasonic delay lines are given intensive treatment in a two-session symposium on theory and design for pulse delay, coding and other aspects. Ultrasonic gear designers will swap data on power measurement. Instruments to measure sound intensity and liquid cavitation will be described.

The complaint is again made that statistical quality control is no longer adequate for system reliability. Two solutions offered are improved testing or design and duplication of equipment.

One man tells how missile test systems are made almost 100 percent effective with an adaptation of European spy system. Tester tests itself. Then tester's test results are tested by standby gear.

Electronics in Space

Space travel is currently attracting the attention of many electronics engineers. Here's a preview of its first major discussion at a national electronics convention:

- Adequate space gear can be developed from present electronics techniques. No technical revolution is needed. Steering methods need more development
- Space conditions are kind to communications. There's no atmosphere on the moon. Mars' air is clean. The clouds around Venus are probably like our own ionosphere
- Accurate aiming from earth will be too difficult. Best bet is optical landing for manned vehicles, radar or tv orbit positioning for the unmanned
- One unknown is the electron density of the sun's corpuscular streams. The very first space ship should be equipped to make measurements

What's New About Explorer III

EXPLORER III—informed sources say it now gets task planned for ill-fated Explorer II—differs in several ways (block diagram, right) from first U.S. satellite.

The key ones: addition of a tape recorder and different uses of two transmitters.

Recorder using phosphoric-bronze alloy tape coated with a thin layer of cobalt—planned to send 100 times more cosmic-ray data earthward—weighs only one-half lb and is just 2½ in. in diameter.

Recorder stores up to two hours of complete-orbit data on 36 in. tape and, upon interrogation, plays it back in only five sec.

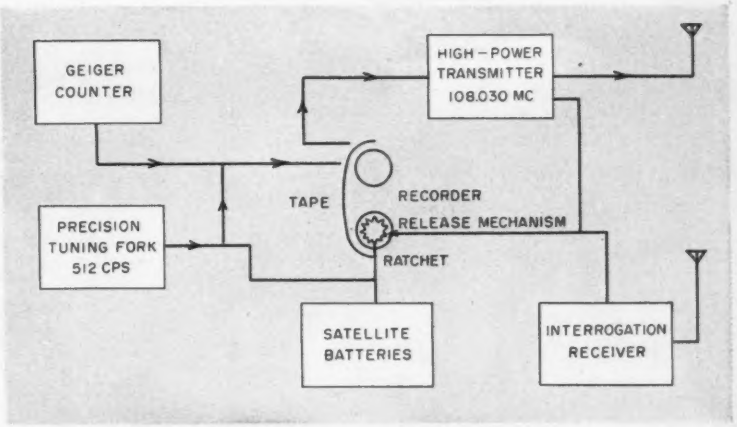
Tape is ⅛-in. wide and 0.001-in. thick and moves forward 0.005 in. at one-sec intervals during recording. Advancing coil requires 20 mw of power; recording and playback amplifiers, only 5 mw each.

Maze of circuits within satellite feeds power to four parts of the recorder—recording and playback heads and advancing and releasing coils. As the tape is advanced, a return spring is wound; this permits the tape to be rewound as it passes over a playback head back to its starting point.

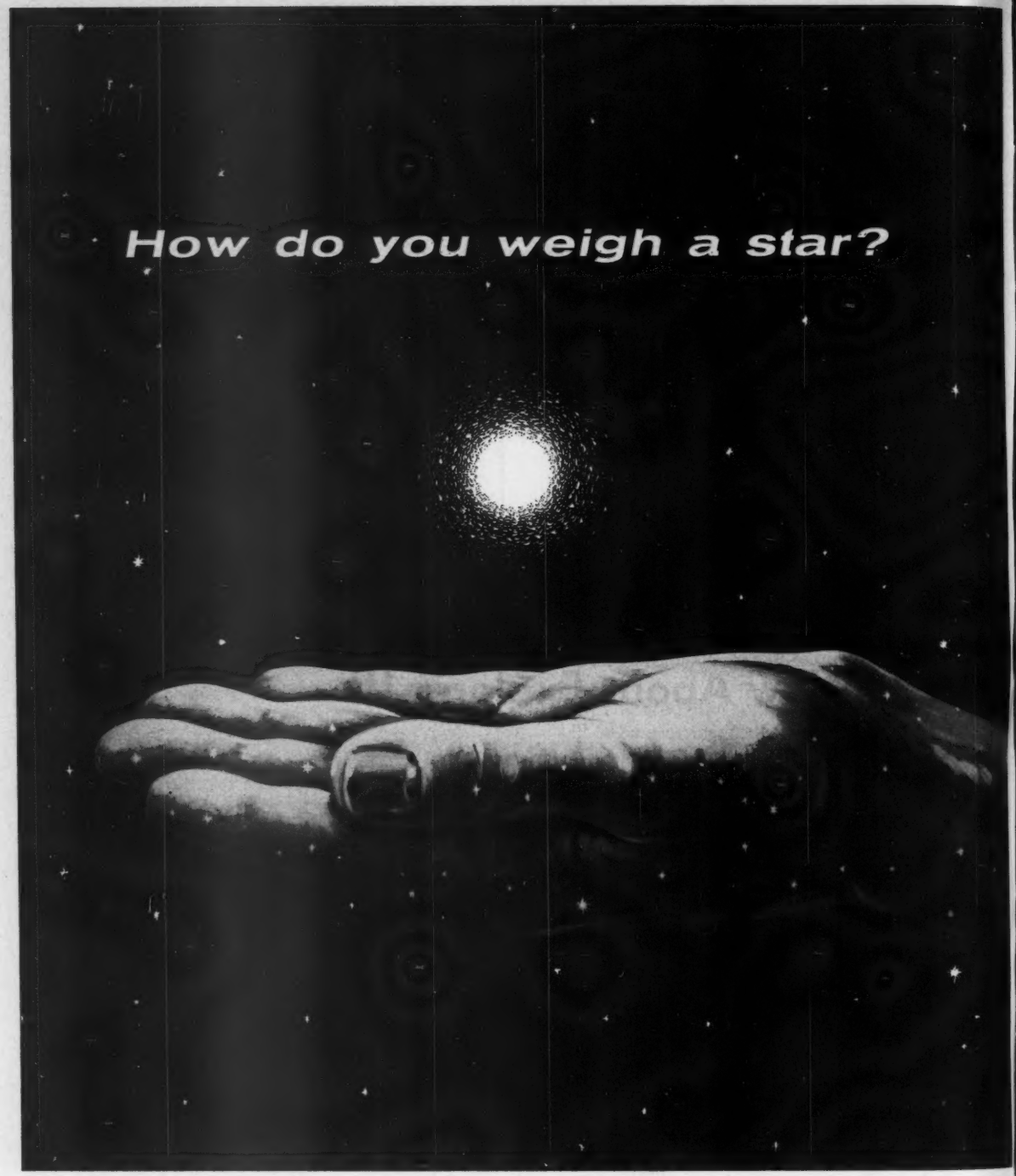
Tape's return speed is controlled by a magnetic brake—an eddy-current retard system composed of a silver disk rotating in a strong magnetic field.

Geiger counter, a 512-cps tuning fork, and tape recorder are connected to high-power (60 mw) transmitter. Its expected life is two months because of power-conserving, five-sec playbacks of recorder. Low-power transmitter (10 mw) ties in with micrometeorite gages and temperature-measuring devices.

Data from Explorer I, which carried an appreciable number of Raytheon silicate transistors, is still being studied.



Principal satellite revisions to take care of miniature tape recorder are indicated in diagram above. High-power transmitter broadcasts cosmic-ray data only.



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ENGINEERING REPORT

Airplanes to Tow Sonar Fish?

CABLE-DROP TECHNIQUE to relatively fixed target, heretofore possible only with helicopters and blimps, may soon be performed by airplanes as well. Method would be used both for air-sea rescue and for towing underwater hydrophones.

Basic idea was originally developed for Missionary Aviation Fellowship, whose members drop packages and messages to inaccessible jungle locations. The airplane flies in a slow circle as a weighted cable drops. When contact is made, the cable is describing an inverted cone, with the target at the apex and the aircraft circling the base. Navy Bureau of Aeronautics is now said to be seriously considering the technique for military applications.

MARCH OF MEDICAL ELECTRONICS takes another step forward with announcement from Northeastern Hospital in Philadelphia that negatively charged air has shown dramatic results in certain types of burn cases. Patients in agony from heat burns are said to enjoy peaceful sleep, without the need for sedative drugs, after breathing the treated air.

After the first emergency treatment in room fairly saturated, during recuperative period the patient breathes the charged air three times daily for total of about an hour a day. Other advantages include less oozing of the burn, lowered infection and more rapid healing.

MISSILE GUIDANCE USING INFRARED techniques has come a long way, but more improvement is upcoming. This is the view of J. A. Sanderson of the Naval Research Laboratory, who spoke recently before the Long Island Section of the IRE. Sanderson points out that ultrasensitive systems cannot distinguish targets from stars. Design problems are made difficult by variability of atmospheric absorption, reflection and radiation, as well as cloud formations and intensity of sun or moonlight.

X-RAY INSPECTION of solid-fuel propellant castings for guided missiles may be simplified by technique announced by High Voltage Engineering of Burlington, Mass. A small radiographic generating unit is lowered into casting and the walls photographed from inside out.

Solution to problem is 10-ft electron-tube extension for supervoltage generator. High-energy X-rays are generated from tip of tube to concentrate intensity in one direction of relatively acute angle. The charge is slowly spiraled upward about the fixed X-ray source and the condition monitored on a remote indicator.

TECHNICAL DIGEST

• **Ultrasonic agitation** of film processing solutions gives negatives practically free from streaks ordinarily encountered with automatic film processing. One setup in Dow Chemical's Denver plant uses a 125-watt Sonogen unit with two transducers submerged in the developing tank. Other advantages include self-cleaning of tanks and hangers, increased solution life and increased film density which permits shorter exposures.

• **Sensitivity of pentodes** to microwave radiation in labs of National Institute of Electronics in Spain suggests possibility of using thermionic tubes in place of silicon crystals for this purpose. Tubes cannot be damaged by excessive radiation, eliminating need for special protective devices required with crystals when same antenna is used for both transmitting and receiving as in radar.

• **Transistorized** liquid density meter developed at Franklin Institute uses glass float attached to voice coil centered in core of differential transformer. Vertical movement of float, proportional to density of liquid sample, is detected by transformer. Voice coil current is varied until force of buoyancy equals downward pull of coil, and liquid density is read directly on scale of meter which measures coil current.

• **Mercury contamination** of labs, potentially as dangerous to health as radioactive hot lab accidents, can be minimized by using mercury vapor monitors continuously when filling electron tubes. Monitors respond to air contamination by millions of invisibly small droplets that splash out whenever mercury is poured or dropped. Laboratory waste should be carried or ocean-dumped in sealed containers just as for radioactive waste. Tolerance level in U. S. is currently set at about 100 micrograms Hg per cubic meter of air, 75 micrograms in England and 1 microgram in Germany.

• **Punched cards** containing transistor parameter information can be quickly sorted with needle to locate optimum transistor for given application, in index system by the Zeus Engineering Corp.

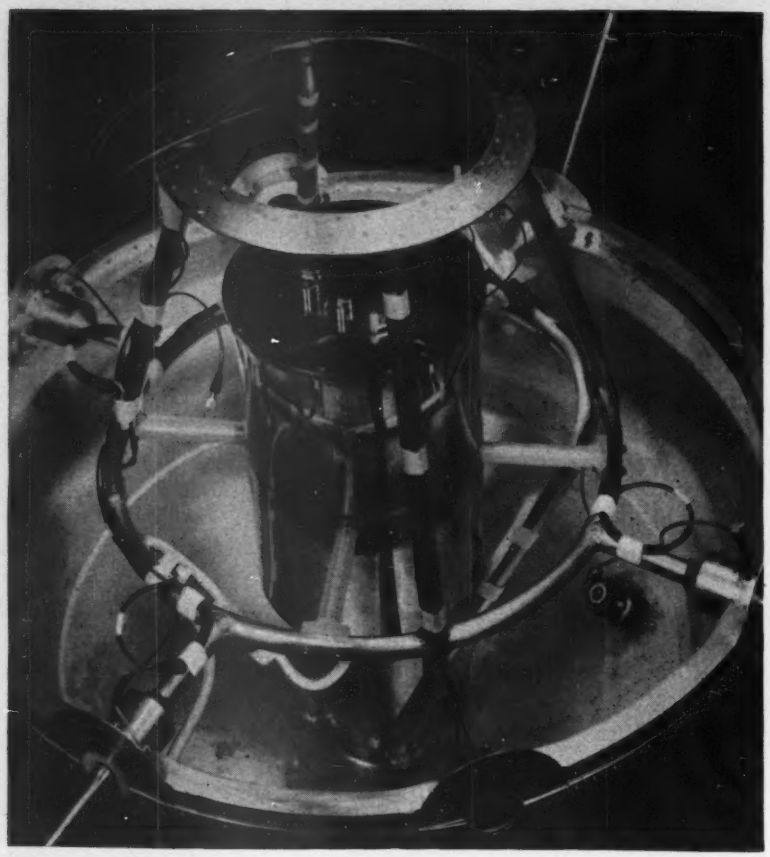


FIG. 1—Cylindrical compartment in center of earth satellite contains telemetering gear that will transmit on high end of f-m broadcast band

Hams Can Aid in Space Study

By WHITNEY MATTHEWS
U. S. Naval Research Laboratory
Washington, D. C.

RADIO AMATEURS can make a contribution to IGY by monitoring and recording telemetry signals from the Vanguard Lyman-alpha environmental satellite. In the event of a short-lived satellite or recordings made during solar flares, such records could be very important.

Transmissions are made at the upper end of the f-m broadcast band. High-fidelity f-m tuners could be readily adapted to receive these signals by the addition of a simple a-m detector preceding the limiter stage. Antennas for fringe-area reception should provide adequate gain.

Many high-fidelity home tape recorders are capable of acceptably recording most of the signals. Stereophonic home recording equipment with one track recording the satellite signal would be most desirable. The second track would contain a simultaneously recorded timing signal of 10 kc or a regularly broadcast WWV time signal including one time announcement. Tape recordings should be made at the highest recording speed available.

The signal from the satellite will consist of a series of high-frequency (5 to 15 kc) bursts carrying information with the frequency during bursts, duration of the bursts and duration of intervals between bursts. A total sequence of 16 such bursts and spaces will present 48 pieces of information. Data contained in the transmissions is shown in Table I.

The satellite will measure ultraviolet radiation in the Lyman-alpha region of the solar spectrum. Associated with the Lyman-alpha experiment will be a silicon solar cell to determine aspect of the satellite with respect to the sun.

Satellite temperature will be measured at three points: the outer shell near the equator, the outer shell near one pole of the sphere and the internal instrumentation compartment. Differential pressure between zones within the satellite will also be monitored.

Surface erosion from collisions between the satellite and particles in space will be studied with small gages attached to the outer skin, two near the pole and one near the equator. A cadmium-sulfide photoresistive cell covered by an opaque layer is also used for erosion measurement. Particles that puncture the thin layer permit sun to reach the sensitive element. Microphones will also be mounted on the outer skin to detect impact of particles.

Complete scans of all channels will be made at a rate of three to four scans per second, depending on the input values to the time-duration channels.

Table I—Satellite Telemetry Channel Assignments

Channel	Frequency	Burst Duration	Interval Duration
A	Lyman-alpha	Polar erosion A	Battery volts
B	Solar aspect	Pressure	Short Calibrate
A	Lyman-alpha	Polar erosion A	Battery volts
B	Solar aspect	Pressure	Short calibrate
A	Lyman-alpha	Polar erosion A	Battery volts
B	Solar aspect	Pressure	Short calibrate
C	Meteor count, 1's	Long calibrate	Battery volts
D	Meteor count, 10's	Package temp.	Polar skin temp.
A	Lyman-alpha	Polar erosion A	Battery volts
B	Solar aspect	Pressure	Short calibrate
A	Lyman-alpha	Polar erosion A	Battery volts
B	Solar aspect	Pressure	Short calibrate
A	Lyman-alpha	Polar erosion A	Battery volts
B	Solar aspect	Pressure	Short calibrate
E	Meteor count, 100's	Polar erosion B	Equator skin temp
F	Peak Lyman-alpha	Equator erosion	Cadmium-sulfide cell

To be useful, each amateur recording of the satellite signal must be accompanied by the following information: the date on which the recording was made, exact location from which made, equipment used, tape speed, number of recording channels and their use and name and address of observer if he wishes the tapes and the interpretation to be returned. All correspondence relative to organized plans to record satellite signals or available tapes should be directed to Code 4105, U. S. Naval Research Laboratory, Washington 25, D. C.

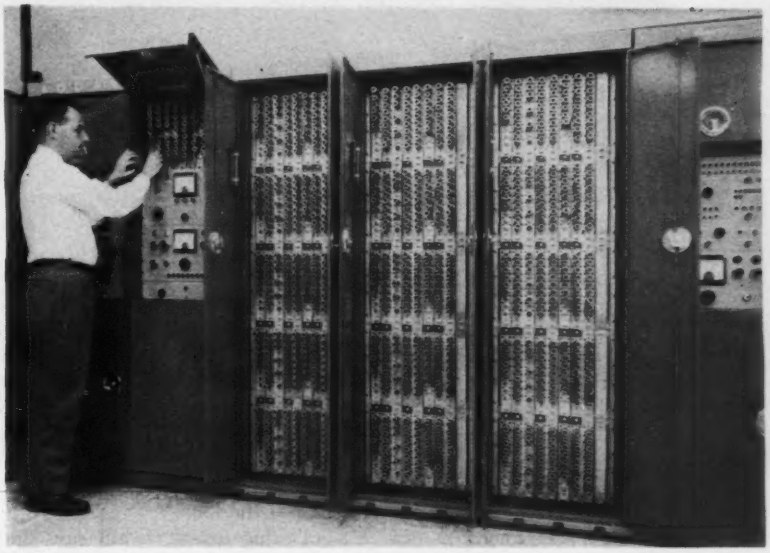
Missile Ohmmeters Use Photocells

SELENIUM rectifiers are being used as the power source in a Wheatstone bridge of ohmmeters used for testing missiles. The ohmmeters were designed by Fairey Aviation in England to reduce the possibility of accidental ignition of missile firing circuits.

Maximum short-circuit current with full light saturation does not exceed 10 ma. Maximum open-circuit voltage is 0.7 volt.

Illumination intensities required to produce a detectable galvanometer current for different ranges and scale settings vary between 0.7 and 12 foot-candles for 100 percent scale reading. Between 2 and 13 foot-candles are required for a 5-percent scale reading.

Converter Has 2,000 Tubes



Analog-digital converter called the Addaverter was built for Space Technology Labs by Epsco for missiles flight studies. Converter permits analog and digital computers to exchange data easily so that each type computer can solve parts of problem it does best

MEETINGS AHEAD

Mar. 24-27: IRE National Convention, All Prof. Groups, Waldorf-Astoria Hotel and N. Y. Coliseum, N. Y. C.

Mar. 26-28: American Power Conf., 20th Anniv. meeting, Sherman Hotel, Chicago.

Mar. 31-Apr. 2: Instruments & Regulators Conf., PGAC, ASME, AICHE, ISA, Univ. of Delaware, Newark, Del.

Mar. 31-Apr. 2: Southwest District Meeting of AIEE, Mayo Hotel, Tulsa, Oklahoma.

Apr. 2-4: Conf. on Automatic Optimization, PGAC, ASME, AICHE, ISA, Univ. of Delaware, Newark, Del.

Apr. 8-10: Sixth National Conf. on Electromagnetic Relays, Oklahoma State Univ., Stillwater, Okla.

Apr. 8-10: Symposium on Electronic Waveguides, Microwave Research Institute of Brooklyn Polytechnic Inst., held at Engineering Societies Bldg., N. Y. C.

Apr. 10-12: Tenth Southwestern IRE Conference and Electronics Show, St. Anthony Hotel and Municipal Auditorium, San Antonio, Texas.

Apr. 14-16: Conf. on Automatic Techniques, IRE, ASME, Statler Hotel, Detroit, Mich.

Apr. 15: Closing date for registration, Intensive course in Automatic Control, scheduled for June 16-25 at Univ. of Mich., Coll. of Engineering.

Apr. 17-18: Second Annual Tech. Meeting, Institute of Environmental Engineers, Hotel New Yorker, N. Y. C.

Apr. 18-19: Twelfth Annual Spring Tech. Conf. on Television and Transistors, Engineering Society of Cincinnati Bldg., Cincinnati.

Apr. 21-25: Society of Motion Picture and Television Engineers, 83rd Convention, Ambassador Hotel, Los Angeles.

May 6-8: Western Joint Computer Conf., First National Symposium on Modern Computer Design, Ambassador Hotel, Los Angeles.

May 12-14: National Aero. & Nav. Elec. Conf, PGANE, Biltmore Hotel, Dayton, Ohio.

Measurements at 750 F

Economic promise is seen in breeder reactors. Some component parts of electronic instrumentation must function during immersion

ARGONNE National Laboratory is building a high-power experimental breeder reactor in Idaho. Some of the components in its instrumentation will have to function during immersion in liquid sodium, radioactive and heated to 700 F, which serves as a coolant.

While conventional components will be used as much as possible, flow and pressure measurement present unique problems, according to Fred Verber, project engineer.

Flow will be measured with electromagnetic and differential pressure units. Low head loss flow tubes will be used with a new liquid-filled d-p cell. Another liquid-filled unit, employing a diaphragm sensing element and strain-gage transducer will measure pressure. Both will deliver a 0-10 mv d-c signal.

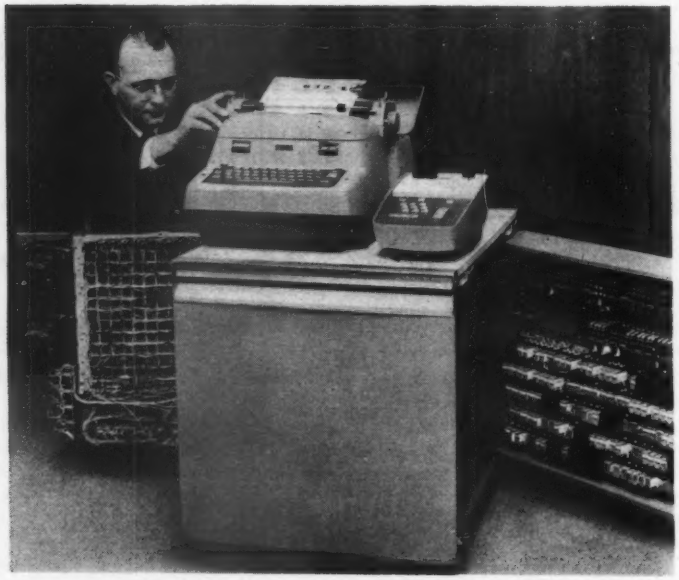
Thermocouples and resistance thermometers will be cased in stainless steel sheaths and insulated with magnesium oxide. Response for certain critical temperature measurements will be 1 second for 63 percent of total change.

Three devices will be used to measure liquid level. An inductive probe will be positioned at the sodium level either by an automatic servo system or manually. A contact probe signals on contact with sodium and a differential pressure cell will be placed at the bottom of the tank.

During initial critical runs and during reloading, high temperature, fast neutron detectors will be placed in the core. Counters designed for 750 F operation will be built to fuel subassembly dimensions. The preamplifiers which will be immersed with the counters will use ceramic tubes and other high-temperature components.

New Tube Ceramic

Workman checks diameter of tube envelope made of Coors nonporous 99 percent aluminum oxide ceramic. Manufacturer says tensile strength is 34,000 psi at normal temperature and 20,000 psi at 2,000 F



Computer, Typewriter Joined

Electronic typing calculator. In IBM's 632 unit, electronic gage (left door) performs computations dictated by numeric keyboard. Relay gate (right door) transmits printing instructions from tape-programmed reader to electric typewriter

Lab Makes Film In 2 Dimensions

ALUMINUM OXIDE FILMS so thin that they have practically only two dimensions are used at Westinghouse Research Labs to support the layers of sensitive material in experimental electronic imaging tubes.

The dimensions of the films are 25 to 50 molecules thick (one millionth in.) by two in. or more in diameter. The films are almost perfectly transparent since their thickness is only one-twentieth the wavelength of light.

Electrons can penetrate sensitive layers without interruption. The films have tensile strength of steel, sufficient to support the films and withstand normal handling.

Simple techniques prepare the films. Aluminum foil is pressed flat. The oxide on one side is removed by a solution similar to lye. The oxide on the other side is built up electrolytically. Then the foil is etched away and the remaining oxide film is washed, dried and mounted on a metal ring.

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Air Force Outlines Projects

Guide to buying of electronic equipment emerges as USAF reveals future plans before Congress

USAF's current and future space flight projects, announced recently, give the electronics industry a good guide to what the Air Force is going to be buying for the next few years.

Highlights of the plans—which were told by Lt. Gen. D. L. Putt, Deputy Chief of Staff, Development, to the House Armed Services Committee—are:

• Military satellite: Pied Piper, also known as ARS and WS-117L, will get $50 million in Fiscal Year 1958, $100 million in FY 1959. Electronic gear will handle data acquisition, transmission, reduction and analysis. A tv camera will be carried. Prime manager Lockheed will be ready to launch Pied Piper "in the very near future."

• Improved secondary power sources for satellites: R&D is underway on four different systems, one of which utilizes nuclear energy and another solar.

• Air-launched IRBM: USAF is placing great emphasis on developing smaller, lighter IRBM's that can be launched well above most of the earth's atmosphere from B-52's, B-58's and B-70's. Precise position finding equipment will be needed for the launching aircraft plus highly accurate pure inertial guidance for the missile. Next step—some time off—will be IRBM's launched from satellites and/or space stations.

• Manned space craft: "The Air Force expects to seek approval soon to begin development of one—and possibly an alternate—approach toward a manned earth-orbiting test vehicle."

Two of the three proposals currently being studied will fly and land as winged vehicles: a modified X-15 that carries rocket boosters to lift the craft to orbiting speed and altitude; and, a boost-glide vehicle called DYNA-SOAR (for "dynamic soaring"). The third proposal is to design a small, light weight vehicle to be sent up as the final stage of a missile. It would have a high-lift and high-drag shape and thus be suitable for manned reentry and recovery.

Any of the three would be an electronic paradise: controls, navigation, telemetry-voice, signal and tv, computers, data analysis.

• Existing components from the ballistic missile programs that can be used in manned space flight are: the Thor, Atlas and the Navaho booster.

• Lunar impact: USAF could shoot the moon this year if given the green light. A basic Thor—without the nose cone—would be the first stage. Vanguard components would also be used. The payloads would consist of radio transmitters to send data back to earth during flight. Flight time would be 2¼ days.

Putt recommended that the Air Force needs to:

• Accelerate DYNA-SOAR.

• Use existing missile capability for satellite launchings, lunar probes and impacts, and interplanetary outer space investigations.

• Begin development of a recoverable manned satellite.

• Accelerate the nuclear rocket engine project.

• Begin additional technical feasibility studies of manned space platforms and other more futuristic space weapons.

• Generate basic and applied research efforts.

MILITARY ELECTRONICS

• **USAF has** more than 5,000 active R&D contracts with some 170 educational and nonprofit institutions and more than 1,700 industrial organizations, USAF Assistant Secretary R. E. Horner told the House Committee on Armed Services recently.

• **Missiles** generally have less instrumental complexity built into them than do manned aircraft designed for the same mission, USAF Chief Scientist G. E. Valley, Jr. said at AFA's Jet Age Conference in Washington: "In one case a manned bomber carries as much as three or four times the number of vacuum tubes and associated hardware as does the equivalent contemporary ballistic missile. In another case, a tactical winged missile carries but one-fifth the number of vacuum tubes and associated guidance hardware as does a contemporary fighter."

CONTRACTS AWARDED

Convair will provide BuOrd with guidance and control equipment for the Terrier surface-to-air missile under $26 million contract.

Telecomputing Corp. gets a $1 million plus addition to its existing contracts with Army Ordnance for nuclear warhead test equipment.

Lear wins a $4,890,610 contract with AMC for its new MARS

(Master Attitude Reference System).

Westinghouse is contracted by AMC for field maintenance of AN/APQ-56 radar sets for RB-47E's, amounting to $200,568.

Hughes will undertake a flight test program for MA-1 and ASQ-25 AWCS for F-106 interceptors under a $3.2 million contract with AMC.

Sperry will sell command guidance data transponder sets for XQ-4A drones to AMC under $496,400 contract.

Curtiss-Wright will provide AMC with radar trainers, AN/GPN-T2A, spare parts, engineering data and maintenance data under $360,787 contract.

Nordon-Ketay is beginning design work on an airborne radar ceilometer that will measure cloud coverage. Development contract is with AMC and amounts to $2,066,625.

Federal Telecommunications Labs will design, construct and test a 100:1 scale model of a helically loaded unipole vlf antenna system for BuShips under a $307,338 contract.

CalTech will provide engineering R&D related to guided missiles, free rockets, materials and wind tunnel operation under contracts amounting to $22,771,492 with Army's Los Angeles Ordnance District.

Gilfillan will supply the Los Angeles Ordnance District with engineering services related to the Corporal missile system under contracts totaling $1,078,266.

Collins will sell AMC Tacan (AN/ARN-21) components for use in F-101B aircraft under $1,848,623 contract.

Beckman Instruments is completing a $¼ million program to supply high-accuracy linear scale ammeters designed to monitor electric power systems in SAC's B-47's. Deliveries have been made to Boeing and to Lockheed.

Textron will supply the Oklahoma City Air Materiel Area with three boresite null-seeking radome systems under a $167,374 contract.

Curtiss-Wright will sell modification kits for flight simulators to Ogden Air Materiel Area under a $464,818 contract.

National will design, develop and produce electronic systems for use with ICBM's under a $4.2 million contract with GE.

Perkin-Elmer gets a $1 million contract for electrooptical azimuth theodolites for aligning inertial guidance system of Thor IRBM.

Sperry wins $21 million system manager contract for a new high-powered, long-range radar program with AMC's Rome Air Development Center.

Siegler gets $1 million contract for a combination data processing closed circuit tv system for Navy's Polaris IRBM.

Collins gets $10½ million contract with the Air Force for design and development of an airborne, h-f single sideband communications system to go into B-52's and KC-135's.

Sperry gets $674,931 contract with BuAer for automatic pilot system instrumentation.

Aeroneutronic Systems will continue research for 12 months in the field of guided missile range instrumentation under a $182,355 supplemental contract with Army Signal Supply Agency.

IBM receives $1,303,419 contract with Rome Air Force Depot for SAGE data processing equipment for AN/FSQ-7 SAGE computer.

GE will sell magnetrons to AMC under $925,350 contract.

Raytheon sells magnetrons to Signal Supply Agency under $345,619 contract.

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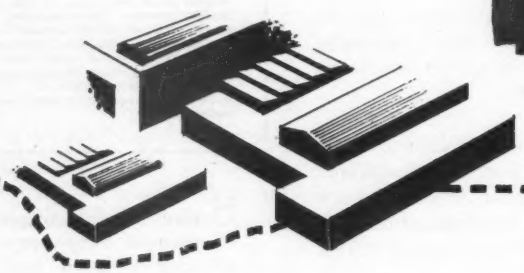

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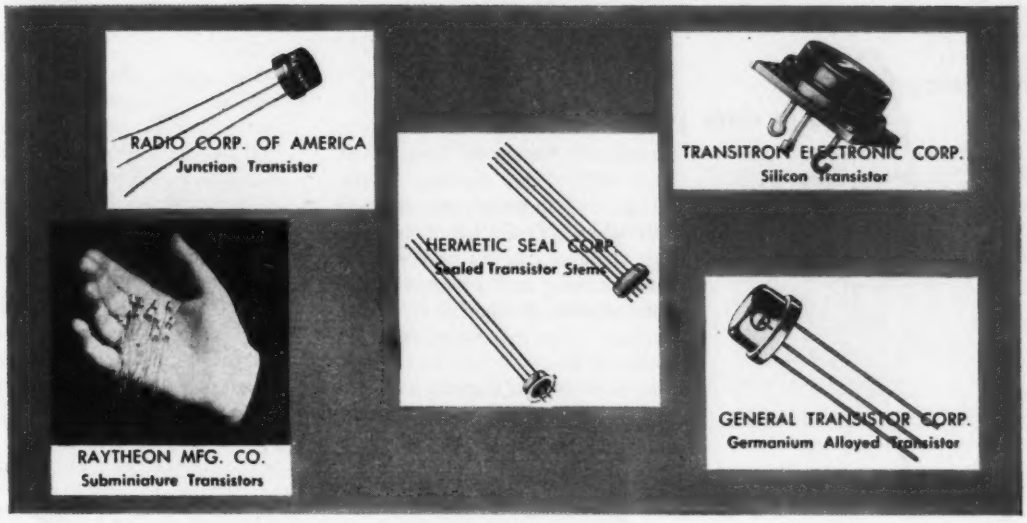
PORTLAND 1, OREGON

Transistor Output Grows



Industry, Military Types

THE tiny transistor, once an interesting gadget, is now one of the most promising basic tools of the electronics industry. The dramatic upsurge in transistor demand is due mainly to industry's success in making units that meet increasingly stringent technical requirements.

Now available from **Radio Corp. of America,** Somerville, N. J., (50) is the 2N404, a junction transistor of the germanium *pnp* alloy type, specifically designed for use in switching circuits of compact, medium-speed military and industrial electronic computers. It is also useful in other low-level, medium-speed on-off control circuits.

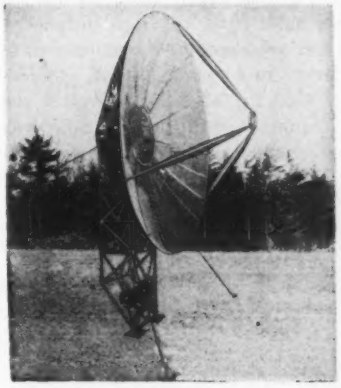
General Transistor Corp., 91-27 138th Place, Jamaica 35, N. Y., (51) offers five new bilateral germanium alloyed junction transistors for medium and high speed switching applications. Two are *pnp* and three are *npn* types. Collector to base voltage range is 20 to 40 v, and alpha cutoff frequency range is 1.5 to 5.0 mc.

In production at **Raytheon Mfg. Co.,** 55 Chapel St., Newton 58, Mass., (52), is a complete line of subminiature *pnp* germanium transistors made by the fusion-alloy process which insures reliability. Thirteen types are available for a variety of applications.

Transitron Electronic Corp., Wakefield, Mass., (53), introduces two high power silicon transistors with ratings to 80 w. Low R_{cs}, typically 1.5 ohms, enables these 60 v transistors to operate at currents to 5 amperes. The ST400 and 2N389 are useful in servo amplifiers, relay drivers and power switching applications.

A line of hermetically sealed JETEC-30 transistor stems is being produced by **Hermetic Seal Corp.,** 29 South Sixth St., Newark 7, N. J., (54), in both Vac-tite compression and matched seals. Hermetic seal glass-to-metal bond provides uniform high mechanical strength and maximum torque resistance.

For more information use READER SERVICE CARD



Large Antenna is mobile

D. S. KENNEDY & Co., Cohasset, Mass. A mobile antenna recently announced has a 28-ft diameter, reflector constructed of welded aluminum and sectionalized to enable it to be stored within its mounting tower. Retractable wheels in the tower are used to convert the structure into a trailer which can be towed over public highways or difficult terrain.

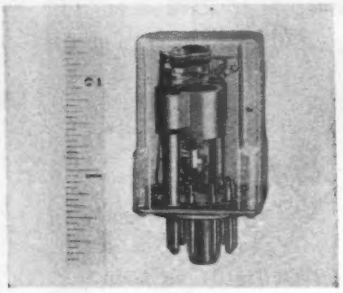
This construction adapts the antenna particularly to scatter propagation site surveys. Since scatter

sites are difficult to choose empirically the mobile feature of this antenna makes it possible to run tests at various locations. Its compact construction and self-stow features achieve many economies in shipping costs.

Known as model 749, the antenna is adaptable for use at frequencies between 200 and 4,000 mc. **Circle 55 on Reader Service Card.**

Meter-Relay

encased in clear plastic



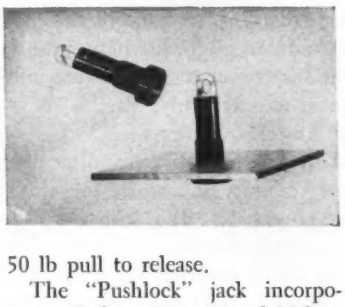
ASSEMBLY PRODUCTS, INC., P. O. Box XX, Palm Springs, Calif. Model 137 meter-relay is cased in clear plastic. Operation of the moving element can be observed. It has a moving coil armature which rotates in the flux gap of an Alnico magnet. The movement rides on polished pivots in vee cup jewels. The bottom jewel is spring mounted sapphire. The top jewel is cushioned glass. The pointer on the movement is a contact of solid iridium platinum. A contact locking coil develops high contact pressure which assures good operation even under vibration. Most ranges will operate during vibration of 10 g from 5 to 200 cycles.

Sensitivity or trip points range from 0.2 μa to 10 amperes for current sensitive units and from 0.1 mv to 500 v. Accuracy of the trip point is within 3 percent. **Circle 56 on Reader Service Card.**

Vibrationless Jack

inserts quickly

WHITSO, INC., 9330 Byron St., Schiller Park, Ill. Fast installation and vibration-proof service are featured in a new "Pushlock" molded Nylon tip jack. The one-piece jack requires no threads, nuts or lock washers. When the fluted Nylon body is pushed through a $\frac{1}{4}$ in. cabinet or chassis hole by drill press, arbor press or other mechanical means, the flutes compress, then expand to provide positive holding action that requires approximately



50 lb pull to release.

The "Pushlock" jack incorporates all the advantages of Nylon. It will give long trouble-free service under severe operating conditions. It is especially suited to mobile electrical and electronic equipment, airborne and marine service and other installations subject to shock and vibration.

High contact pressure and low electrical resistance are provided by a heat-treated, silver-plated beryllium copper contact. The terminal lug is hot solder dipped for easy solder connection. The component accommodates a standard 0.081 in. diameter tip plug, and is rated at 10,000 v d-c. **Circle 57 on Reader Service Card.**

Glass Tubing

with precision bore

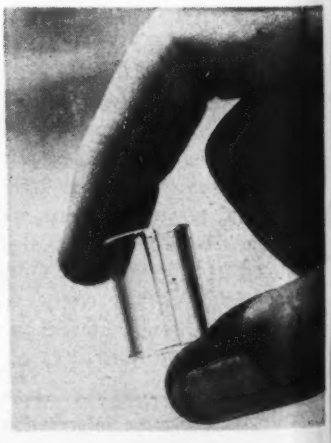
CORNING GLASS WORKS, Corning, N. Y. Precision bore 96 percent silica glass tubing with inside diameter tolerances up to ± 0.0005 in. has been announced.

Vycor brand tubing can be manufactured with precision bores in diameters ranging from $\frac{1}{8}$ to 3 in. Maximum lengths of the tubing presently is 36 in.

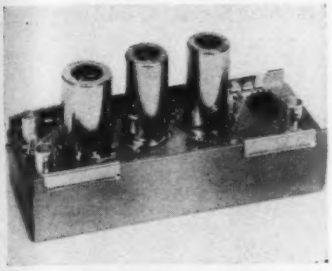
Special slots or indentations on the inside of the tubing can also be made with precision tolerances. Width dimensions can be held to ± 0.003 in.; depth of indentations can be held to ± 0.002 in.

Extremely low thermal expansion, excellent dielectric characteristics and chemical stability of Vycor brand glass give the new tubing excellent properties for high standard electronic equipment.

The tubing is currently being used as the coil form in a long-life transformer. Other potential uses



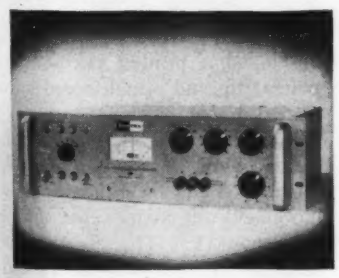
are as measuring devices in high temperature work, enclosures for high frequency, high temperature transmitters and receivers, and precision resistors. **Circle 58 on Reader Service Card.**



I-F Preamplifier in two models

INSTRUMENTS FOR INDUSTRY, INC., 150 Glen Cove Road, Mineola, N. Y. Model P205 i-f preamplifier is designed to be fed from a crystal mixer having a 200-300 ohm balanced output. A variation of the P205 is the P205A which is available for 200 ohm unbalanced mixers.

This unit will provide a gain of 20 db with a bandwidth of 10 mc. It is designed to operate with either the IFI M-235 (10 mc i-f strip) or the IFI M-230 (2 mc i-f strip) or it may be used with other 50 ohm input i-f amplifiers. **Circle 59 on Reader Service Card.**



Voltage Standard and null meter

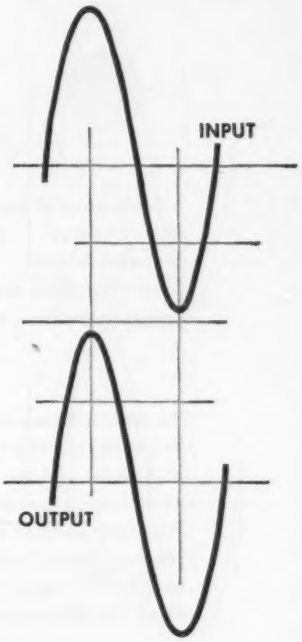
KIN TEL, a division of Cohu Electronics, Inc., 5725 Kearny Villa Road, San Diego 12, Calif. Model 301 is an extremely compact variable d-c standard and null meter. Direct reading calibrated dials provide instant voltage selection with standard cell accuracy. The unique chopper stabilized circuit constantly compares the output with an internal standard cell to provide stability, accuracy and excellent dynamic characteristics. As a null voltmeter, the unit measures voltage from 1 to 501 v with excellent accuracy. It has 4 decaded null meter ranges from 50 v to 50 mv full scale. The meter can also be used to read an external input voltage or the output voltage of the d-c supply in the 301. Literature is available giving circuit description, specifications and applications. **Circle 60 on Reader Service Card.**

Standard Cell Oven regulated unit

JULIE RESEARCH LABORATORIES INC., 556 W. 168th St., New York 32, N. Y. Saturated standard cells provide the most accurate d-c voltage reference available. Proper application of such units requires an enclosure which is temperature regulated to extreme precision due to the temperature coefficient of cell voltage.

The SCO-106 precision lab oven provides regulation of 0.01C short term, permitting 2 μv stability in standard cell voltage. Long term regulation is 0.05C. A built-in thermal resistance bridge permits measurement of enclosure temperature to 0.005 C. The regulated enclosure provides space for 3 cells of the type used at the National Bureau of Standards to maintain the primary voltage standard. Use of three cells permits definitive self-

NO WAVEFORM PROBLEMS



You can . . . Simplify Design Circuitry With G-E Inductrol* Voltage Regulators

The G-E Inductrol voltage regulator does not introduce harmful waveform distortion in your circuits.

Because it's an induction device, this voltage regulator offers you the advantages of brush-free operation . . . no voltage drift and tubeless control. Result: the ultimate in reliable voltage control.

For more information write Section 425-16, General Electric Company, Schenectady, New York.

*Registered trademark of General Electric Company for Induction Voltage Regulators

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the contributions of skill...

A combination of men, their ideas and their experience . . . the Computer Products Division . . . is an important source of products and engineering services in the data processing field.

The Systems Engineering Laboratory has proved competence in the development of large scale data processing systems, which incorporate standard sub-units of extreme reliability, marginal checking arrangements, efficient use of redundancy, and serviceable logic.

The Applied Physics Group is experienced in solid state physics, metallurgy, chemistry, magnetics and mechanics. These fields intersect in the development of information storage devices.

...A PRODUCING WHOLE

Separate manufacturing facilities provide, efficiently and rapidly, a high quality supply in any quantity of products and systems . . . magnetic storage and input-output devices, digital information storage and retrieval systems, and random access files and systems.

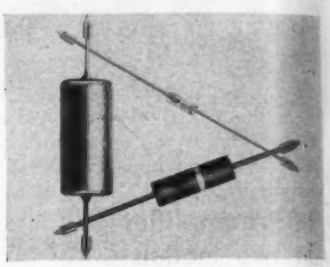
LFE *Computer Products Division*

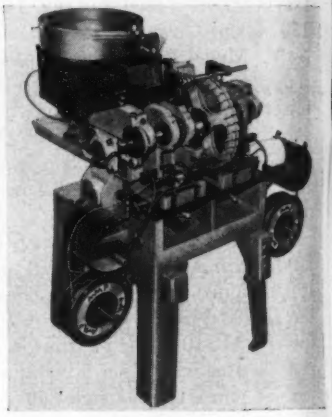
LABORATORY FOR ELECTRONICS, INC.

141 MALDEN STREET **BOSTON 18, MASS.**

checking by cell intercomparison.

While primarily designed for standard cell application the oven may be used to regulate precision standards of any type which fit within the enclosure volume of 6½ in. by 3 in. by 3 in. Heater supply is 24 to 28 v d-c. **Circle 61 on Reader Service Card.**





P-C Termination and tipping machine

AMP Inc., Harrisburg 34, Pa., has developed a printed circuit component tip and a high speed automatic tipping machine.

A major feature of the tip application is the prevention of cold solder problems by eliminating any movement of components during dipping cycle. The tip permits bridging or offsetting of components to improve air circulation and to eliminate temperature influence. Design of the tip promotes solder-wicking and uniform solder deposit and also protects fine semiconductor leads from heat and assembly damage.

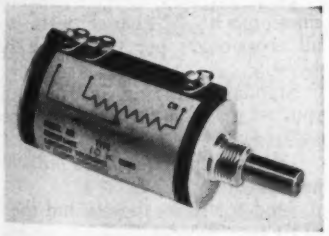
The new machine was designed to apply AMP component tips to leads of single-piece or belted com-

ponents on a high-speed production basis. **Circle 62 on Reader Service Card.**

Solar Cell Module
basic building block

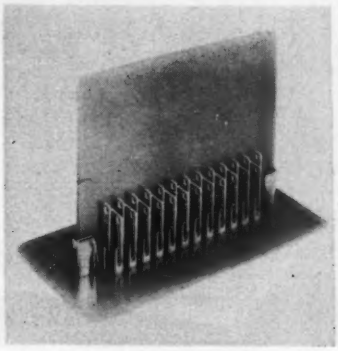
INTERNATIONAL RECTIFIER CORP., 1521 E. Grand Ave., El Segundo, Calif. A nine cell silicon solar cell module, basic building block for industrial type solar batteries, is available. Four units of the type pictured will deliver 1 w of power in direct sunlight. Cells offering greater efficiency are available for military type applications.

The cells used in this module are also available individually for development work. Information on mounted and unmounted types in standard and selected types is included in bulletin SR-156. **Circle 63 on Reader Service Card.**



Potentiometers
all metal cases

VOAK ENGINEERING CO., 129 East A St., Upland, Calif. New Milipots, multiturn precision wire wound potentiometers, are 1 in. diameter by 1.8 in. long and feature all metal cases. Other features include dual terminals riveted to terminal board, terminals independent of resistance element terminations, very low end resistances to 0.01 percent of total resistance, standard screw-driver slotted stainless steel shafts, permanently lubricated bearings, precious metal brushes and slip rings, and elimination of both "O" rings and shaft end-thrust on rear cover. They are also available with plain phenolic case. **Circle 64 on Reader Service Card.**

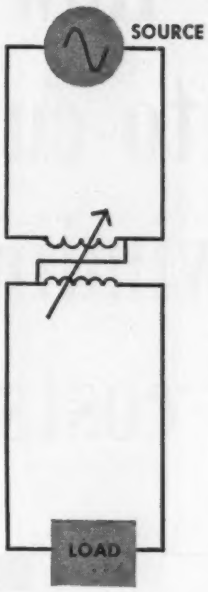


P-C Connector
tiny contact space

ELCO CORP., M. St., below Erie Ave., Philadelphia 24, Pa. The 5203 series is a printed circuit Varicon connector to plug-in module boards perpendicular to a mother board. It is designed for miniaturization with 0.100 in. contact spacing. The mother board has two rows of Varicon stand-off contacts at 0.125 spacing staked and soldered to the p-c lines. On the module board lower and upper tier straight contacts are used. Each tier has contacts spaced 0.200 in. apart, with the upper tier contacts mounted between adjacent lower tier contacts, resulting in a final 0.100 in. contact spacing for this connector. These contacts are also staked and soldered to the p-c lines of the module board.

This connector can be made for any number of contacts and any pattern. Standard spacing is 0.100 in., but any larger spacing can be made. Brackets to be fastened to the mother boards $\frac{1}{16}$ in., $\frac{3}{16}$ in. and $\frac{1}{8}$ in. can be supplied. Con-

NO FREQUENCY PROBLEM



You get . . .
Finer Control
From G-E Inductrol*
Voltage Regulators

The G-E Inductrol voltage regulator gives you precise voltage control even with varying frequency. Using the induction principle, this highly reliable voltage regulating equipment offers you the advantages of simple, brush-free operation, no voltage drift (just set it and forget it) plus many other extra features.

For more information write Section 425-13, General Electric Company, Schenectady, New York.

*Registered trademark of General Electric Company for Induction Voltage Regulators

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GENERAL ELECTRIC

CIRCLE 36 READERS SERVICE CARD

How to cut winding costs

New versatile Leesona® Cross Winder increases production and lowers costs through reduced handling and winding time

Now — with the high output No. 111 Winder, you can produce cross wound coils of extreme accuracy singly or in multiple.

Quality coils are assured by a precision traverse system that cuts rejects to an absolute minimum.

Also, fine wire can be wound at high speeds without the danger of breakage by abrupt starts. An electronic drive starts the arbor slowly . . . gradually accelerates to full preset speed . . . and maintains a constant rate of speed for uniform wire tension and coil density from then on. All the operator has to do is press the start button.

Reduces Handling Time

Exclusive, optional programming attachment automatically stops the No. 111 Cross Winder so that your operator can remove taps. In many cases, this allows the operator to handle more than one machine.

For multiple winding, the No. 111 can be equipped with an arbor transfer attachment that permits your operator to make group transfers — no individual anchoring of wire turns required here.

An optional pie-winding attachment automatically indexes coils from 3/32" to 1/2" between coil centers.

The versatility of the No. 111 Cross Winder demonstrated above doesn't tell the whole story of its many uses. Equipped with a progressive coil attachment, it can be used for high speed winding of variable and constant pitch progressive coils. It can also be used for single layer winding, bobbin winding, and is ideal for laboratory requirements.

Changing coil "specs" has be speeded up too. On the Leesona N 111, gears are located on fixed cent so they have to mesh properly. T operator merely drops the cha gears into position — no tools needed. No other cross winder off this time-saving convenience.

Other features are:

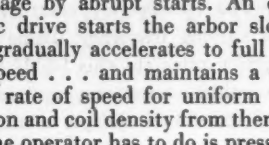
Dial controlled variable-speed tra mission with 22 change gears co all cross-overs per turn from 10 1/3 —

Standard winding speeds to 2 rpm — up to 5000 rpm with spe pulleys —

Traverse speeds to 4000 cross-ov per minute.

Send for more details and the 111 Cross Winder Bulletin.

23



FOR WINDING COILS IN QUANTITY
. . . ACCURATELY . . . AUTOMATICALLY
. . . USE LEESONA WINDING MACHINES

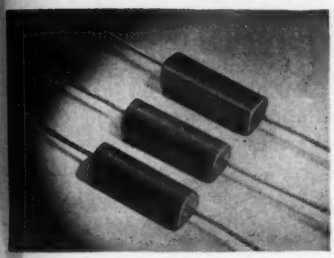
UNIVERSAL WINDING COMPANY

P. O. BOX 1605, PROVIDENCE 1, R. I., DEPT. 123

9 So. Clinton St., Chicago 6, Ill. • 1500 Walnut St., Philadelphia 2, Pa.

SEE THIS NEW MACHINE IN OPERATION AT BOOTHS 4313-4315 AT THE IRE SHOW

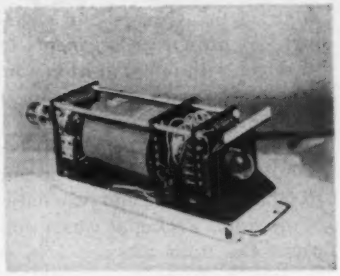
tacts are available for mother boards of $\frac{1}{16}$ in., $\frac{3}{32}$ in., $\frac{1}{8}$ in. and $\frac{3}{16}$ in. and for module boards of $\frac{1}{16}$ in. and $\frac{3}{32}$ in. Contacts are phosphor bronze, gold flash over silver. The contact resistance is less than 0.002 ohm and stays constant over several thousand insertions and withdrawals. Current rating is 5 amperes. The connector is suitable for all common board materials as XXXP or glass epoxy. **Circle 65 on Reader Service Card.**



Flatted Resistor encapsulated

CLAROSTAT MFG. CO., INC., Dover, N. H. Encapsulated, with a flatted area, the latest Fixtohm deposited-carbon precision resistor presents certain advantages over the conventional round cross-section. Flatted area serves as index surface for automation, permitting orientation of marking and leads. It may be used as an adhesive mounting for unusual vibration, shock and power requirements, doing away with mounting brackets with their associated weight and space needs. Marking area is extended to three sides and readily seen. Also there is no roll.

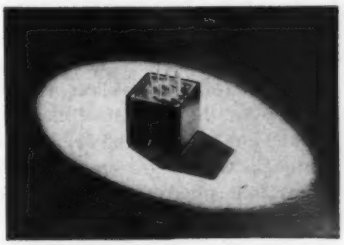
Type CMF style RN70B $\frac{1}{2}$ w Fixtohm is available in a resistance range of 10 ohms to 2.5 megohms, ± 1 percent tolerance. Power rated at $\frac{1}{2}$ w at 70 C, derated to zero power at 150 C. Insulation resistance greater than allowable of 100 megohms minimum; in order of 100,000 megohms. Moisture resistance less than allowable of 3 percent, in order of 1 percent. Temperature coefficient of maximum 500 ppm or 0.05 percent per ohm per deg C. **Circle 66 on Reader Service Card.**



Decade Counter with Nixie readout

BURROUGHS ELECTRONIC TUBE DIVISION, North Plainfield, N. J., has announced a new 1 mc counter with Nixie numerical readout tube which is claimed to be the only decade counter with provisions for resetting from any position to zero in less than 1 μsec.

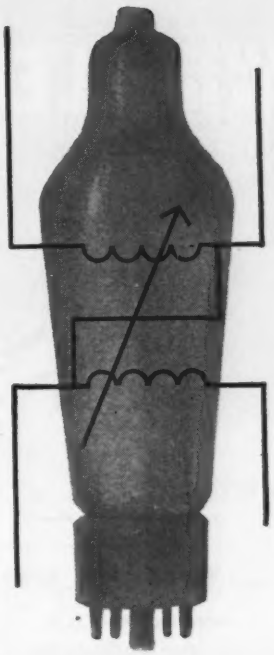
Designed as a companion unit to the decade counters types 101 and 102 whose counting rate is 10 kc and 100 kc respectively, this plug-in unit is designed to achieve the highest speed counting and resetting while still making all ten outputs available for print-out or other general purpose applications. Power requirements are 300 v 30 ma d-c, and 6.3 v 0.9 ampere a-c. The unit features high reliability through the use of the beam switching tube. The Nixie indicator provides precise in-line figures visible 30 to 40 feet. **Circle 67 on Reader Service Card.**



Shift Register transistorized

EPSCO COMPONENTS, 588 Commonwealth Ave., Boston 15, Mass., announces a new series of transistorized magnetic shift registers, type SR-60, designed to operate from 0 to 60 kc. These magnetic elements have signal to noise ratios greater than 15 to 1 with voltage

NO TUBE PROBLEM



You get . . . Greater Reliability From G-E Inductrol* Voltage Regulators

Because G-E Inductrol voltage regulators are induction devices, there are no tubes to replace or maintain. This highly accurate $\pm 1\%$, reliable and economical voltage-control equipment has many operating advantages. It has "set it and forget it" tubeless controls which are unaffected by power factor, frequency or load changes. These engineered extras, plus drift-free controls, make Inductrol regulators one of the world's most reliable voltage regulators.

For more information write Section 425-15, General Electric Co., Schenectady, N. Y.

*Registered trademark of General Electric Company for Induction Voltage Regulators

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GENERAL ELECTRIC

CIRCLE 38 READERS SERVICE CARD

and **WHEELER**

more than ever is a

DESIGN ENGINEER'S

best source

for practical engineering help and exceptional production facilities in the fields of:

Transformers and Reactors
Coils—Toroids
Delay Lines
IF and RF Components
Electronic Chassis Assemblies
Wiring Harnesses
Electro-Mechanical and Electrical Sub-Assemblies
Sound Powered Electric Telephones

WHEELER ELECTRONIC CORP.
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IRE
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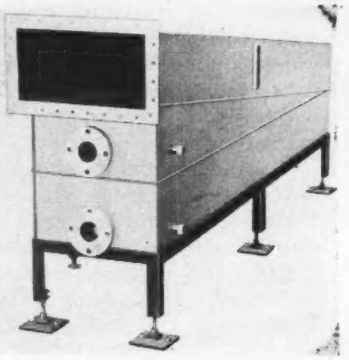
HOSPITALITY SUITE
at the St. Moritz Hotel,
Central Park South

IWH58

CIRCLE 39 READERS SERVICE CARD

drops of 0.5 v across drive windings. As many as 30 elements can be driven with one transistor. Only one voltage source is necessary for both driver and shift register.

The units are completely encapsulated for maximum resistance to shock, vibration, and penetration of moisture. Packaging is very compact. The units measure $\frac{7}{8}$ in. sq by $\frac{3}{4}$ in. high, equipped with a 9-pin base for standard tube socket or printed circuit mounting. **Circle 68 on Reader Service Card.**



Waveguide Load high power

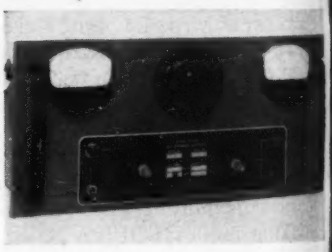
CONTINENTAL ELECTRONICS MFG. Co., 4212 S. Buckner Blvd., Dallas 27, Texas, has developed a new waveguide load (WR2100) capable of absorbing average powers of one megawatt and peak powers of 10 megawatts. The vswr of this load is less than 1.25 to 1 in the 300 to 530 mc range and less than 1.10 to 1 between 350 and 530 mc. A type 525A Mega-Sorber utilizes a water wedge for the dissipative element. Water flow rate of 175 gpm through the load is required for maximum rated dissipation. The complete installation includes external heat exchanging equipment. Dimensions of the laod are 11 ft by 2 ft by 3 ft. **Circle 69 on Reader Service Card.**

VHF Transmitter 50-w unit

COLLINS RADIO Co., Cedar Rapids, Iowa, announces development of a new 50-w vhf transmitter for ground-to-air a-m voice communication and VOR service. Offering continuous operation in the 108-152-mc range, the 242F-5 transmitter features adjustable carrier output to any level from 10 to 50 w. Linear power amplification is utilized to maintain low spurious output and to minimize intermodulation interference produced by operation of transmitters with antenna systems in close proximity.

Although a single-channel transmitter, the 242F-5 offers additional service on up to four channels within a 500-kc spectrum as an optional feature. Remote control is possible under a wide variety of conditions.

Overall frequency stability is ± 0.005 percent for the service conditions where standard CR-23/U crystals are used. Modified CR-23/U crystals are available which give ± 0.002 percent stability within a temperature range from zero C to + 60 C. **Circle 70 on Reader Service Card.**



D-C Power Supply tubeless laboratory types

OPAD ELECTRIC Co., 69 Murray St., New York 7, N. Y. Model TM25 is a tubeless laboratory type regulated d-c power supply, especially designed for experimental and circuit design applications. It provides reliable, ripple-free d-c power under adverse line voltage or load conditions. Compact, low-weight design makes it equally useful as a field test instrument, as well as a laboratory power supply.

It has a continuous duty rating of 0-150 v d-c at 2 amperes. Voltage regulation is held to ± 1 percent and ripple is less than 0.01 percent of the average d-c at maximum output. **Circle 71 on Reader Service Card.**

Literature of the Week

MATERIALS

Extruded Plastics. Anchor Plastics Co., Inc., 36-36 36th St., Long Island City 6, N Y, has published a 12-page, 1958 edition of "Extruded Plastics" It includes the latest information on complex shapes, rods, tubes and moldings. It describes fabricated parts, discusses thermoplastic materials suitable for extrusion, and gives material property tables. Applications of extruded parts is also shown. For a complimentary copy, write on business letterhead.

COMPONENTS

High Frequency Brochure. General Transistor Corp., 91-27 138th Place, Jamaica 35, N. Y., offers the 12-page brochure G-150 describing its h-f transistors. The brochure gives maximum ratings, cut-off and small signal characteristics, and charts showing the common emitter output static characteristics, for 4 *npn* and 5 *pnp* transistors. **Circle 72 on Reader Service Card.**

Pulse Transformer. Pulse Engineering, Inc., 2657 Spring St., Redwood City, Calif., has issued a new bulletin describing the model ES-3 subminiature pulse transformer. The ES-3 discussed is a spherical form encapsulated in epoxy resin to a maximum diameter of $\frac{3}{8}$ in. for simplified mounting on printed circuit boards. **Circle 73 on Reader Service Card.**

Slip Rings. Poly-Scientific Corp., Blacksburg, Va., has published an engineering booklet entitled "Design Considerations for Miniature Slip Ring and Brush Assemblies." A price list is included.

Also available is a brochure describing the company and its products. **Circle 74 on Reader Service Card.**

Transistor Transformers. Ferrotran Electronics Co., 693 Broadway, New York 12, N. Y. Loose-leaf perforated literature on the company's audio and rectifier miniature transistor transformers is available. Typical electrical characteristics and prices are shown. **Circle 75 on Reader Service Card.**

EQUIPMENT

Closed Circuit TV. Blonder-Tongue Laboratories, Inc., 9 Alling St., Newark 2, N. J., announce publication of a 16-page booklet describing their low-cost closed circuit tv systems. Examples of the variety of applications are included. **Circle 76 on Reader Service Card.**

Vibration and Shock Mounting. Federal Shock Mount Corp., 1060 Washington Ave., New York 56, N. Y. A four-page bulletin describes engineering vibration and shock mounting systems for airborne electronic equipment and other applications. Designated bulletin F1A, the publication cites the several different types of damage to sensitive instruments caused by vibration and shock. Descriptions and illustrations are given of Federal variable-damped engineered mounting systems, along with a detailed discussion of the design and selection of the component parts of these systems. **Circle 77 on Reader Service Card.**

FACILITIES

Facilities Brochure. Gray Mfg. Co., 16 Arbor St., Hartford, Conn., announces a facilities brochure for engineering, research, design and production of electronic and electromechanical products and assemblies. It gives a brief history of the company since its beginning in 1891. There are brief biographies of some key engineering personnel, illustrated descriptions of facilities from laboratory to final assembly and testing, and illustrated examples of typical products, both technical and commercial. **Circle 78 on Reader Service Card.**

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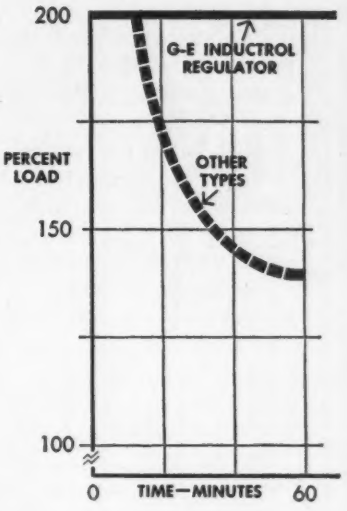

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For more information write to 425-14, General Electric Company, Schenectady, N. Y.

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Tv Tapes Top 100 Mark

Upswing from 15 units sold by last November is seen as sure sign tape recorders are here to stay

BY NEXT MONTH more than 100 tv tape recorders will be in use throughout the country, according to industry sources. This compares with a total of 15 last November.

Time enters the marketing equation because east coast evening programs must be delayed by network stations in different time zones. Film storage of off-the-air pickup costs about $125 an hour to produce. Tape costs about $10.

Another money-saving aspect of tape is using it to prepare an evening broadcast schedule while daytime personnel is available. The taped show which requires no processing can then be broadcast by a small night crew. Tape users say the resulting picture is comparable to live pickup.

Broadcasters have shown considerable interest in the recent announcement that a color conversion system is now available. In Chicago, WGN-TV is expecting delivery of this color accessory in June.

Sales prospects look good for color tapes duri the coming year. One company sees the increas use of color tape as an aid to color tv receiver sal by enabling broadcasters to expand their color pr gramming time.

Broadcasters using video tv tape include KIN TV, Seattle, who purchased their unit last Nove ber. Another unit went to KGW-TV in Portlan KRON-TV, San Francisco began using a record last month, plans to do all 'live' programming tape.

Among the networks, ABC has three machines Chicago, six more on order. NBC and CBS b have five in Hollywood with more on order.

Further evidence of growth in tv tapes is se in the development of specialized splicing tec niques, proposed standards, and the interest of ind tries other than broadcasting.

One forecast of interest is the possibility of usi tv tape to record activities in medicine. "Wh sound storage has meant to heart ailment study a other areas of medicine," says a manufacture spokesman, "video storage can mean to students surgery and diagnosis."

FCC ACTIONS

• **Invites** attention of lawyers practicing before commission to rules detailing computation of time lapses.

• **Announces** amendment of tables governing U. S./Canada border frequency allocations with consequent changes in Alberta, Manitoba, Ontario and Quebec.

• **Advises** that seven additional tables showing tv broadcast financial data for 1956 are available on request from FCC's Washington offices.

• **Amends** aviation services rules to permit continued use of 420 to 460-mc band for aircraft altimeter operations until Feb. 15, 1963.

• **Shifts** channel 11 from Galveston to Houston, Tex., effective next week, and modifies license of Gulf Tv Corp. to allow operation in Houston instead of Galveston.

• **Denies** petitions by WTVJ, Miami, and WITV, Ft. Lauderdale, Fla., for reconsideration of addition of channel 6 to Miami.

• **Makes** effective a January decision granting application for a new a-m station by Radio Franklin, in Rocky Mount, Va.

• **Grants** c-p for new channel 13 station in Hibbing, Mich., to Carl Bloomquist.

• **Approves** application from KWNA, Winnemucca, Neb., for change from unlimited hours of operation to specified hours.

• **Allows** power increase to KDES, Palm Springs, Cal., from 500 watts to one kilowatt on 920 kc, daytime.

• **Grants** c-p for new class B f-m station to KCBQ, Inc., San Diego, Cal., to run on 10.79 mc.

STATION MOVES and PLANS

KTHV, Hutchinson, Kans., peti tions for switch of channel 1 from Hutchinson to Wichit Kans.

KTHS, Little Rock, Ark., files f control transfer from W. H. Bro son to Times Publishing Co.

WTAM, Atlanta, Ga., seeks c to increase power, change antenn transmitter and studio location.

WTAE, Pittsburgh, Pa., plans o eration from Pittsburgh instead McKeesport after FCC shift channel 4 yesterday from Irw Pa.

KCMK, Kansas City, Mo., files f license to construct new f-m broa cast station.

WMAC, Albany, N. Y., plans no educational f-m station for Alba Medical college of Union Univ sity.

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Big magnesium and aluminum extrusions produced from Dow's 13,200 ton press

A whole new range of king-size dimensions is now available for design engineers. Dow's new 13,200 ton extrusion press at Madison, Illinois, is producing "special" sizes for quick delivery. These projects include work for aircraft and missiles, automotive, building, and highway construction. Here's what the big press can do in the way of magnesium and aluminum extrusions to meet your special requirements.

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Defense Asks $2 Billion

Second call for added military money will push this year's defense budget to over $41 billion. Electronics' share also rises

THE DEFENSE DEPT. was hammering together a supplemental appropriation request for roughly $2 billion for fiscal 1959, as ELECTRONICS went to press.

This will be added to the $39.1-billion budget sent to Congress two months ago, and comes on the heels of the $1.3-billion supplemental appropriation for fiscal 1958, recently rushed through Congress.

The Administration's second call for extra defense funds in two months will push next year's military expenditures over the $41-billion level for the first time in six years.

According to latest Defense Dept. information, the supplemental defense appropriation request will include funds for such projects as:

• The Bell Labs-Douglas Nike Zeus antimissile missile. Up to now, the project has been carried in the Army's budget, has been severely limited by allocations of funds. But lately there have been growing signs of the Pentagon's intent to push the project faster. Air Force says its competing RCA-Convair Wizard has been dropped, but RCA is being allowed to continue work on the system's electronic parts. The overall project is now under the aegis of the Pentagon's newly-organized Advanced Research Projects Agency.

• Boeing's B-52 heavy bomber and KC-135 jet tanker. Under current plans, production of both planes is scheduled to end by the end of next year. The Air Force, however, wants to continue production of the aircraft. Reason: to bolster the Strategic Air Command until ICBMs and supersonic manned bombers become operational in volume. Another factor: growing political pressure to keep B-52 and KC-135 production workers on the job.

• Construction of at least three $80-million atomic submarines armed with the Polaris IRBM and accelerated output of the missile (main electronics subcontractors: MIT, GE, Interstate Electronics, Anaheim, Cal.). The Navy now has funds to build three ships, has long-range plans for a fleet of at least 20 vessels.

• Development and launching of space satellites and vehicles. ARPA has several dozen proposals for wide-ranging types of space projects—such as rockets to the moon, reconnaissance satellites and manned flight in so-called "boost-glide" rocket vehicles. Right now space development work is limited mostly to the Air Force's Lockheed Pied Piper reconnaissance satellite, IGY research projects, early development of very high-thrust, single-chamber rocket motors and related features of the ballistic missile program.

• Stepped-up work on the Air Force's Martin Titan ICBM (major electronics subcontractors: Arma, Bell Labs, Sperry Rand).

• Construction of additional ICBM bases. Funds are already on hand for work on three installations. Now Air Force generals talk of "selecting several others on which construction might start this year." Presumably, existing Air Force installations will be converted into underground ICBM launching sites.

Also under study for inclusion in the new supplemental defense appropriation request—but less likely to get final approval:

Proposals to (1) reinstate production orders for tactical fighters, fighter-interceptor and transport aircraft; (2) to increase output of the Air Force's Northrop Snark 5,000-mile subsonic cruise missile.

(3) to push work on the nuclear aircraft project much faster; and (4) to increase production of advanced types of tanks, small arms, ground communications gear.

Air Force Cites Needs

"We have barely stepped across the threshold of electronics in the military effort. Within the next ten years, the marvelous equipment of this year will appear to be childish by comparison." This opinion was expressed by Lt. Gen. C. S. Irvine, Air Force Deputy Chief of Staff, Materiel, speaking before the Armed Forces Communications Electronic Association in Washington early this month.

One interesting space vehicle under study is a satellite with a circular orbit of over 20,000 mi. It could hover under control over a given portion of the world. It would be used for reconnaissance observation or for countermeasures against hostile communications. Highly effective telemetering will be necessary in space vehicles. For space communications, there must be highly specialized ground observation and control stations. "Electronics holds the real key to all our future efforts," he said.

At the present time, there is urgent need for a ballistic missile early warning system. For such a system 3,000-mi range radar sets will be geographically located to get maximum coverage and minimum reaction time. The system must be able to positively identify missiles, decoys, manned aircraft, meteors and falling nose cones.

There is also need for design of systems that can perform one complete major function. There has been too much tendency to build a system for a narrowly defined purpose and add to it as required, resulting in an aggregation of barely compatible units, he said.

Another problem is oversophistication. There is a tendency, as performance is stepped up, to add more circuits and components whereas there should be a lesser number for best reliability.

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complete with their own independent battery power supply. Three days later American Missile delivered the first unit. Reliability was proven when the Jupiter "C" roared off the launching pad sending back its musical message of unending scientific data.

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Is Poland's Door Opening?

She's considering how to spend her latest loan here. 'Reasonable' electronic exports may be approved

POLISH INDUSTRIAL CHIEFS this month are reportedly deliberating over how to spend the $98 million Export-Import Bank loan announced in February. If they make up their collective mind to seek some U. S. electronic gear under the relaxed controls now in effect, exporters may want to take a new look at the Polish market.

A Polish trade spokesman told ELECTRONICS at press time that officials had been "in touch with some American companies" but Poland did not have a "big program" of imports because of "payment difficulties." He said he believed his country was "interested" in some electronic equipment, but that he could not be specific because the decision on what Poland would seek in the U. S. had not yet been made in Warsaw.

At the same time, ELECTRONICS learned that U. S. electronics will invade the international trade fair at Poznan, Poland, for the first time June 8-22. An American color tv studio will transmit live telecasts to eight receivers at the fair grounds at the request of the Department of Commerce. American firms customarily exhibit at fairs in Communist countries with U. S. "good will" rather than "hard sell" in mind.

Since a change in the political climate culminated in the first Eximbank loan of $95 million for Poland last summer, U. S. trade with Poland has been rising. Even in the first nine months of 1957 trade with Poland accounted for 62 percent of all U. S. trade with Eastern Europe in that period. This compares with 24.3 percent in 1947. But up to now, with emphasis on agricultural commodities, electronics exports have been negligible.

This situation could change, however. Last year's relaxation of export controls extended to Poland the general license provisions for export to the Free World. But more tempting to electronics exporters is the fact that consideration on the basis of individual merit is now being given by the government to individual applications to export commodities classified as "strategic".

These are "Positive List" items and include radio and television apparatus, detection and navigational gear, X-ray apparatus, magnetic recorders and other electronic equipment. Commerce Secretary Weeks' latest quarterly report on export control declares that Positive List commodities, "while still requiring validated licenses, may be approved if the commodities and quantities involved are considered to be reasonable and necessary to the Polish civilian economy."

Certain electronic components not on the Positive List also require individual validated licenses for shipment to Poland. Applications for these licenses are considered on their individual merits, says Secretary Weeks.

DEVELOPMENTS ABROAD

• **Egyptian industralists** and engineers have formed the first firm in the Arab world to make transistor radios and electronic equipment. Firm is Egyptian Transistor Co. It is scheduled to produce portable transistor radios and more than 1,000 transistors a month.

• **In France** plans are being made to hold the Second International Conference for Analog Computations in Strasbourg Sept. 1-7. Technical papers will cover various systems of analog computation and their applications, and comparisons between analog and arithmetical computation in electronics. An exhibition of new equipment is also planned. Conference is sponsored by the International Association for Analog Computations whose secretary is F. H. Raymond, 318 Blvd. de Verdun, Courbevoie (Seine), France.

• **Red China's** academy of sciences reports completion of a cyclotron by its physics institute. No details of Red China's first cyclotron are given, but it had been announced last May that 1957 would see the completion of a 25-million-volt cyclotron and heavy water atomic reactor with 7,000 kw output.

EXPORTS and IMPORTS

West German firm AEG (Allgemeine Elektrizitaetsgesellschaft) reports sales of $295 million in the business year ending Sept. 30, compared to $262 million for the preceding year. Adding sales of subsidiaries, the total amounts to $476 million for the year against $428 million previously. Exports of AEG, excluding subsidiaries, amounted to $53 million compared to $47.6 million in the prior year.

In Tokyo the Nippon Electric Co. is reportedly planning large-scale export of transistor radios using solar batteries to Southeast Asian and Middle Eastern countries. First

shipments were scheduled to reach India, Syria and several other countries by this month. The radios will cost an estimated 25,000 yen (about $70) each.

In Amsterdam the Siegler Corporation and the Iron Foundry and Enamel Factory (Vulcaansoord) of Terborg have jointly established the Siegler Netherlands-American Trading Co. Vulcaansoord has obtained a 25-year license for the manufacture and distribution of all Siegler products throughout Europe. New firm will handle sales.

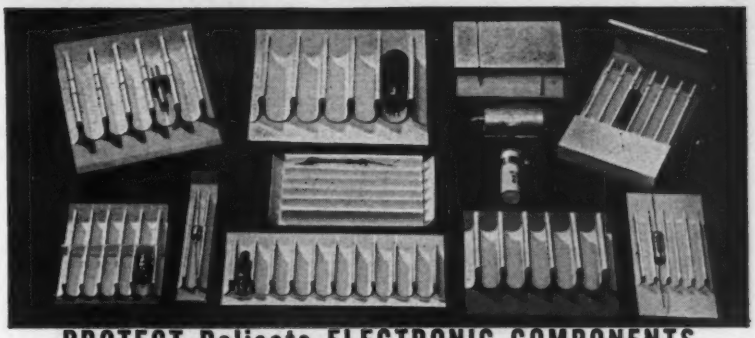
West Germany's defense ministry has ordered about $12 million worth of radar and fire control equipment for the West German navy from Hollandse Signaal Apparaten NV, a Philips subsidiary.

In Rome Societa Industrie Elettroniche, an affiliate of Italy's big power company, Societa Edison, has begun to manufacture civil and military radar under a license agreement with Raytheon.

Venezeula's Radio Valencia has purchased a complete tv station from Marconi of England. Radio Continente has purchased a Marconi medium-frequency sound transmitter.

Denmark's new research reactor (D.R. 3) at Riso will get its instrumentation from a British firm, Ekco Electronics. System provides: measurement and control of the nuclear process, giving linear logarithmic and differential indication of reactor power; and automatic safety system operating on information obtained from both nucleonic and physical instrumentational ancillary nucleonic measurements; and measurement of radiation levels.

In Uganda spear-carrying cattle rustlers may meet their nemesis this year in the form of a $750,000 police vhf network just completed by the British Marconi company. Uganda police authorities now believe they have enough radio-equipped vehicles and receivers to foil cattle stealing by the natives of the Karamoja district.



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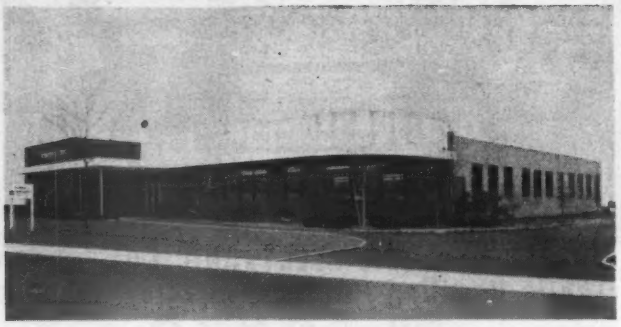

Parts Distributor Expands

THE PROBLEM of keeping the missile industry's wheels constantly in motion has been solved, in part, by the introduction of a new element —the distributor specialist.

An example of this role is Schweber Electronics, which recently moved to a new 10,000 sq ft building (picture) in Mineola, N. Y.

The new building is designed specifically for inventory depth of electronic component lines tailored for the missile field. Every item manufactured in 10 component lines is stocked here, available says the firm, for immediate delivery anywhere in the nation.

For example, a call from Turner Air Force Base in Albany, Georgia, requested a recommended type of connector unavailable in any local source. Schweber had the item in stock; and it was packed and shipped the very same day, eliminating at the inception what could have been a budding bottleneck.

Hundreds of contractors and subcontractors feed their time and energies into the task of getting ballistic missiles into the nation's weapon closet in the shortest possible time. The concentration in depth of component parts within Schweber's specialties frees the firm's customers of heavy and near-impossible inventory burdens.

This warehousing for customers involves a highly intricate method of inventory control. Since better than 98 percent of the company's business is conducted via telephone, each of Schweber's eleven sales specialists keeps in close touch with inventory on the shelves.

A stock record available to all salesmen notes the exact number of each component on hand. After just a quick glance, reports the firm, any member of the sales staff is able to promise delivery, to the hour, if necessary.

PIC Acquires Another Line

IN East Rockaway, N. Y., PIC Design Corp. announces the acquisition of a precision tool component line from VON Industries, Inc., of Mineola, New York.

The purchase of this new precision tool line of standardized parts will increase the inventory of PIC approximately 25 percent.

Hoffman Labs Names New V-P

RICHARD A. MAHER is appointed vice president-engineering of Hoffman Laboratories, Inc., Los Angeles, Calif. He was previously chief engineer at Hoffman Laboratories, the military research, development and production subsidiary of Hoffman Electronics Corp.

Maher's duties will include supervision of all engineering projects of Hoffman Laboratories, including such fields as radar, communications, navigation, countermeasures, sonar, fire control and guided missiles.

Prior to joining Hoffman, Maher was manager of engineering for the government and industrial division of the Philco Corp., Philadelphia, Pa. Before that he was director of the research and development department for radio and tv for the Crosley Div., Avco Mfg. Corp., Cincinnati, Ohio.

Trav-Ler Radio Hires D. F. Shea

RETIRED rear admiral of the U.S.N., Daniel F. J. Shea, joins the executive staff of Trav-Ler Radio Corp., Chicago, Ill., as a vice president.

For two and a half years Shea was assistant head of the radio division in charge of procurement and production of all radio equipment for ships and aircraft for the Bureau of Ships, Navy Dept., Washington, D. C.

In January 1948 he became vice-president and director of Hazeltine Research, Inc., and remained there until Dec. 31, 1957.

Lord Promoted By Du Mont

A NEWLY created top level post in the Industrial and Military Equipment Division at Allen B. Dumont Laboratories, Inc., has been assigned to J. Nelson Lord, Jr. (picture), formerly military operations manager. In his new post, Lord will assist F. H. Guterman, vice-president and general manager of the division, with overall administration of the division's military operation. He will be directly responsible for the coordination of

military sales activities with contract administration.

Lord joined the DuMont organization in 1949 as a sales representative of military products. In 1954, he was named assistant manager of government sales. Three years later he was promoted to government relations manager, and in the same year, he was named military operations manager.

Anatran Is Now Digitran Co.

FORMATION and move of the new Digitran Co. into new headquarters (picture) in Pasadena, Calif., is announced. Formerly known as the Anatran Division of Endevco Corp., the new company will independently continue its rapid development and expansion as a maker of electrical readout mechanical counters and digital motors for computers, automation and systems designs.

Pacific Mercury Gets Subsidiary

ACQUISITION of Telemetering Corp. of America, Los Angeles, Calif., is announced by Pacific Mercury Television Mfg. Corp., Sepulveda, Calif. The company will function as a wholly owned subsidiary of Pacific Mercury.

Telemetering Corp. designs and builds prototype equipment for transmission, reception and recording of data from guided missiles and aircraft in flight.

With its acquisition by Pacific Mercury, Telemetering Corp. has at its disposal complete facilities to carry out mass production of units under development. At the same time, Pacific Mercury acquires a talent pool of skilled engineers and designers in the field of missile research.

Talbot Takes New Post

APPOINTMENT of W. LeMar Talbot to the newly created position of business manager for Microwave Engineering Laboratories, Inc., Palo Alto, Calif., is announced. He was previously associated with the management consulting firm of McKinsey & Co., Inc.

The appointment is part of an overall expansion program under way at MELabs, an electronics research and development firm founded in 1956. At present the company occupies 7,000 sq ft of laboratory space, employs 36 people, and has a current backlog of orders between 1.5 million and 2 million dollars.

Andrew Corp. Upgrades Lane

RETAINING his offices in Westwood, Mass., C. Robert Lane (picture) has been named eastern regional manager of Andrew Corp., Chicago, Ill. He was regional manager for the New York and New England states.

In his new position he will continue to personally supervise the sales and engineering service in

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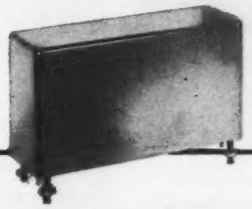

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A division engaged in the manufacture of electrical items.

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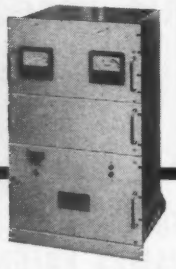

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This special section offers you an economical means to keep in contact with the key people of the electronic industry who most naturally will be interested in your products and services.

this area and direct the company's sales activities on the entire east coast. The Andrew sales engineering office in Ridgewood, N. J., will be under his supervision.

Prior to joining Andrew three years ago, Lane was associated with General Communications Co. and Gabriel Electronics, as commercial sales manager.

In assuming his new position, Lane announced the assignment of John M. Lenehan to the position of sales engineer at the company's Ridgewood office.

Friedman Takes New Position

ELECTRONICS Research Associates, Inc., Cedar Grove, N. J., appoints Stanley Friedman (picture) to the position of manager, customer service department. In this new position he will be responsible for the quality control department, short order department and coordination of the indicated activities.

Prior to his association with ERA Friedman was employed as senior project engineer at G. M. Giannini & Co. Before that he was an assistant scientist in the R&D group at the Los Alamos atomic project.

G-E Appoints Manager

WITH General Electric Co. in microwave relay work since 1950, I. Tunis Corbell has just been appointed manager of microwave design engineering for the company's communication products department in Syracuse, N. Y.

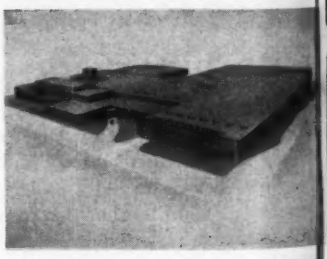
In his new position, he will be responsible for microwave systems engineered for utility firms, pipeline companies, toll road authorities and various other types of users.

Corbell succeeds A. Clarke Gunn, who is now manager of design engineering for military equipment, including the communication products department's portion of a multimillion dollar G-E contract on scatter communication for the U.S. Air Force.

Litton Names McFall V-P

RUSSELL W. McFall is named vice president of Litton Industries Beverly Hills, Calif., and general manager of the Maryland Division. He fills the post vacated by Harvard L. Hull who resigned to become president of Nucledyne Corp., a subsidiary of Cook Electric Co. in Chicago.

An executive with the General Electric Co. in their missile and ordnance systems activity, McFall had been with GE since 1943, engaged in the engineering aspects of the company's advanced military developments.



Chester Cable Corp. Expands

COMPLETION of the three steps of their plant and facilities expansion is announced by Chester Cable Corp. (picture), Chester, N. Y., a subsidiary of Miami Copper Co.

Total available plant area is now

ELECTRICAL ELECTRONIC *ENGINEERS*

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POSITIONS WANTED

Engineer 7 years experience UHF-VHF specialist wants overseas contract 12-15 months, available June '58. PW-7371, Electronics.

Advertising & Sales Promotion Manager. Electronics experience. Ask for resume. PW-7448, Electronics.

SENIOR ENGINEERS PHYSICISTS

Warwick, a leading manufacturer of television, radio, phonograph, tape recorders, located in northwest suburb of Chicago offers outstanding opportunities to men who desire professional recognition and are able to assume major responsibility in the Research Department.

APPLICANTS MUST HAVE:

Equivalent of a college degree and preferably have done graduate work.
3-7 years experience in television or related areas. Proven ability think logically and direct technicians and junior engineers.

The following positions are open:

SENIOR RESEARCH ENGINEERS —transistors

Must have 2-5 years experience in the application of transistors to high frequency, low frequency in pulse type circuits and must be capable of both theoretical and experienced analysis of transistor operation.
1-2 years experience in field of TV preferred.

SENIOR RESEARCH ENGINEER —Advanced Circuits Analysis

Must have strong research background — with a minimum of 3 years electronic experience; must be familiar with advanced analysis methods dealing with electronics, also must have demonstrated creative ability.

Research work will be supported by draftsman, electronic technicians, model makers, mechanical engineers, mathematicians and progressive administration.

Mail summary of personal data education and experience or contact:

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2 6.3 VAC @ 10 amps unreg.....**$390.00**

Model D5-300B Dual Reg. Supply
2 0-500 VDC. 0-300 ma.
2 Bias Voltage 300 VDC. fixed
2 6.3 VAC. @ 10 amps unreg.....**$390.00**

Model 5-300F Reg. Supply
1 0-500 VDC. @ 0-300 ma.
1 0-300 VDC. @ 0-150 ma.
1 6.3 VAC. @ 10 amps unreg.....**$240.00**

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1 0-300 VDC. @ 0-1500 ma.
1 0-150 VDC. @ 5 ma.
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Model D5-200C Dual Reg. Supply
2 30-500 VDC. @ 0-200 ma.
2 6.3 VAC. @ 10 amps unreg.....**$375.00**

Model 4-200X Sub Chassis Mtg. Supply
1 400 VDC. @ 0-200 ma.
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1 6.3 VAC. @ 6 amps unreg.....**$75.00**

Model 1.5-150X Sub Chassis Mtg. Supply
1 150 VDC. @ 0-150 ma.
1 6.3 VAC. @ 6 amps unreg.....**$50.00**

Model 28-5MX Sub Chassis Mtg. Supply
1 28 VDC. @ 0.5 amps unreg.....**$30.00**

Several other models in limited quantities

APN4B Loran—New with mounts, plugs, and new PE-206 Inverter....**$119.50** ea.

Kay Mega-Sweep Video Generator, Calib. Model—Excellent .....**150.00** ea.

Electronic Research Assn. Model CC-200 Constant Current Generator...**150.00** ea.

LXI Signal Generator Model 8-330MC—Metal Case—Like New.....**175.00** ea.

Hickok Universal Video Generator Model 650C—Like New .....**150.00** ea.

Hewlett-Packard Test Oscillator Model 650A—Excellent .....**250.00** ea.

Hewlett-Packard Audio Oscillator Model 205A—Excellent .....**250.00** ea.

TS-175/U Frequency Meter 85-1000 mc.—Excellent .....**300.00** ea.

Dumont Type 342R Cathode-Ray Oscillograph 50-400 cy.—Excellent..**450.00** ea.

Teletronic Lab. Model 101 Oscillograph—Excellent .....**150.00** ea.

General Radio Vacuum Tube Fork 1000 cy. Type 723A with power supply—New Condition .....**75.00** ea.

General Radio Oscillator 500 mc. Type 857A with power unit. Type 857-A-P1—Like New .....**100.00** ea.

Photoflash Specials

G E FT-524 Quartz Photoflash Tubes 3000 W.S.—New .....**$20.00** ea.

G.E. 80 mfd @ 4000 V. Photoflash Capacitors 640 W.S.—New .....**49.50** ea.

Sprague 100 mfd. @ 4000 V. Photoflash Capacitors 800 W.S.—New ....**62.50** ea.

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Christie Electric Corp.	2810
Dale Products Inc.	2742-2744
Daystrom Instrument Div. of Daystrom Inc.	1901, 1909
Electronics	4401-4403
General Electric Co.	2906, 2908 2912, 2914, 2916, 2920, 2924 2928, 2932, 3003, 3004
Knights Company, James	2708
Laboratory for Electronics	3207-3209
McGraw Hill Book Co.	4405
Merck & Co., Inc.	2006
Moloney Electric Co.	1224
Pacific Automation	1719
Phalo Plastics Corp.	4104
Radio Corporation of America	1602, 1707
Sangamo Electric Co.	1213
Texas Instruments Incorporated	2816, 2820
Textronix Inc.	3027, 3030
Tung-Sol Electric Inc.	2833, 2839
Universal Winding Co.	4313-4315
Victory Engineering Corp.	2230
Wales Strippit Co.	4010
Wheeler Electronic Corp.	1332

200,000 sq ft of floor space, an increase of 75,000 sq ft. The three phases just completed included: Increased production capacity which necessitated additional storage area for raw materials as well as added production machinery and new processes; enlargement of laboratory personnel and equipment for research; and the setting up of larger experimental sections for testing of both materials and finished products.

The decision to increase facilities was necessitated by an increasing demand for Chester's plastic coated, teflon wrapped, extruded teflon and nylon coated wires and cables.

News of Reps

Autotron, Inc., Danville, Ill., appoints **Macrae-Smith Co.**, with offices in both Dallas and Houston, Texas, to handle sales of its line of industrial electronic controls in Texas, Louisiana and Oklahoma.

The Daven Company's switches, attenuators, precision wire wound resistors and test instruments, will be marketed in the states of North Carolina, South Carolina, Tennessee, Georgia, Alabama, Mississippi and Florida, by **Murphy and Cota Co.**

E. V. Roberts & Associates is appointed to handle sales for potentiometer manufacturer, George Rattray & Co., Richmond Hill, N. Y., in California, Arizona, Nevada and New Mexico.

THE components division of International Telephone and Telegraph Corp., Clifton, N. J., has appointed the **Jack Goss Co.** of Somerville, Mass., as its New England sales rep for Federal selenium rectifiers.

Magnetic Controls Co., Minneapolis, Minn., announce two new sales reps. They are **H. W. Brede, Inc.**, New York, N. Y., in metropolitan New York City, Long Island and northern New Jersey; and **J. R. Dannemiller Associates, Inc.**, Cleveland, Ohio, who will represent the company in Ohio, Michigan, West Virginia, western Pennsylvania and eastern Kentucky.

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